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Indexed in the Industrial Arts Index. Published every Thursday. Subscription Price United States, its Territories and Canada $8; other Western Hemisphere Countries $15; Foreign Countries $20 per year. Single copy, 35¢. Annual Review Number, $2.00.

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Cable Address, "Ironage" N. Y.

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The IRON AGE

Vol. 161, No. 11 March 11, 1948

Editorial

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Technical Articles

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Features

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News and Markets

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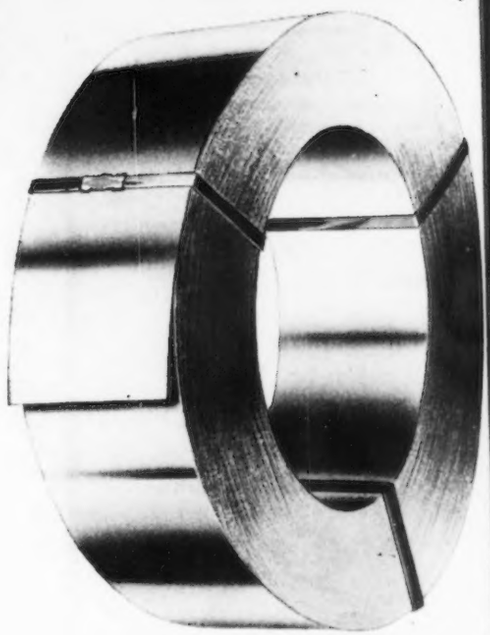
Number 1 on our HIT PARADE

the Customer!



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ESTABLISHED 1855

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March 11, 1948

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Emphasis on Defense

DURING the past seven days two events have torpedoed the complacence of those who still have faith in the security of the United States. The first—the capitulation of Czechoslovakia to the well-known Soviet tactics of propaganda, penetration and perfidy—has received ample headline attention. The pathetic effort of Benes and the stubbornly stupid liberals who have tried to conciliate the Communists by qualifying their birthright of freedom has been duly emphasized. The lesson, we fear, will have little effect on those determined humanitarians who still insist that a friendly understanding, short of abject surrender, is possible with Stalin.

Czechoslovakia seems a long way off—geographically. The miles which measure the land and sea span between the Czechs and the Americans seem to assure that insulation which in the past has always given us the breathing space necessary to mobilize our defenses. Is this insulation still real?

That brings us to our second item. Herbert Hoover made a speech in which he stated that western Europe in the event of a war between the U.S.S.R. and the U.S.A. would probably remain neutral—billions of American aid notwithstanding. It is hardly necessary to add that this is no frivolous hunch on the part of our ex-President. It is supported by the sober judgment of top-flight soldiers and hard-headed students. With the probable exception of Turkey, Greece, Spain, Canada, Chile, Argentina and Brazil, we stand alone, facing a threat that carries the possible climax of a *Pax Sovietica.*

It is therefore high time to take stock of our defenses. During the late war this country provided the decisive punch in the European theatre and defeated Japan practically single-handed in the Pacific. Great credit is due to the magnificent courage of the millions of American men and women in the services and their brilliant leadership. However, our foes likewise had brave soldiers and able leaders.

The spectacular and conclusive advantage which assured victory was the overwhelming industrial power which this country was able to mobilize on comparatively short notice. It was our ability to produce food, fuel, munitions and the complex equipment of war in adequate volume, not only for our own forces but for those of our allies, that proved decisive. It was the output of American arms that assured dominating firepower on the battlefield, American-made airfleets that secured control of the skies, and American ships that provided protection and transport across the seas. Our allies in the aggregate, with greater manpower and resources, were not able to match the production of American industry.

The vital distinction that made this superiority possible was the private management of industry, operating with capital volunteered in response to the classic incentive of profit and manned by a working force enjoying those freedoms now suffering progressive extinction in other parts of the world.

In the face of this threat, our successful defense—a defense in depth—must be provided by industrial power. Brave soldiers, competent leaders, the atomic bomb, armored columns, a modern navy and powerful airfleets—these are the "cutting edge" of military power. Back of it must be an irresistible industrial potential—a potential measured by productivity, assured by freedom and guaranteed by the incentive of reasonable profit.

Joseph Stagg Lawrence

SAFE FLOORS?

BROTHER, GIVE ME 4-WAY FLOOR PLATE!

This man's right, Mr. Management. Workers appreciate the extra safety they get when you install Inland's modern, skid-resistant flooring in your plant. Its 4-way safety lug pattern provides built-in protection and economy wherever feet or equipment must go . . . floors, walkways, ramps, platforms, steps.

What's more, Inland 4-Way Floor Plate reduces maintenance problems. It won't burn, warp, crack, splinter, or absorb liquids, and it's easily installed. Stocked by leading warehouses.

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INLAND 4-WAY FLOOR PLATE

◆ Faced with a shutdown due to a shortage of steel, a switch box manufacturer threw up his hands to his customers—the electric utilities. "Get us some steel, and we'll be glad to fabricate it for you." Since steel mills cannot operate without large supplies of power, two large electric utilities have gotten enough steel to keep the company operating at a merry pace.

◆ With the delivery promises of hot-rolled alloy bars moving out, cold drawers report their delivery promises will have to be extended if this trend continues for any length of time.

◆ A die casting machine, believed the largest in commercial operation, has been built for a Canadian customer by an Eastern firm. The machine, of cold-chamber type, has a clamping pressure of 1000 tons and features a built-in arrangement for automatically feeding a measured amount of aluminum to the injection chamber. The chamber has a capacity of 15 lb.

◆ A production and export plan for the German motor car and industrial vehicle industry in Bizonia has been drawn up for 1948. Total production is estimated at 40,000 cars and the same number of industrial vehicles. This compares with permitted output of 160,000 cars and 61,500 industrial vehicles.

◆ A steel company which used to operate on a minimum of 30 days scrap supply has been operating out of freight cars all winter. Meanwhile, an auto plant is running on steel taken directly from cars. Yet the steel plant and the auto factory have not been closed for lack of scrap and steel. When these sources shout about short supplies they are truthful. What they fail to say is that they've learned to operate that way.

◆ A small steel mill now has to pay $7.70 a net ton more for its semifinished rerolling billets. It has raised its price on strip $10 a ton to make up for the advance in raw steel. The difference between the $7.70 figure and the talked-about $5 a ton increase in semifinished steel is due to an increase in size extra charges.

◆ Coal mining costs have been mounting. Increases on timber, trucking, track spikes and nails have all been chalked up since the first of the year, but it's a good bet that no price increases will appear before the labor picture is cleared up.

◆ A Midwestern sheet producer has just completed a study which shows that the cold-weather-switch from natural gas to fuel oil added 76¢ to the cost of a ton of sheets.

◆ German steel producers in Bizonia, instructed to raise output from the present level of around 3 million to 6 million tons in the 12 months from Apr. 1, take a somewhat despondent view of the prospects. They are understood to have been promised enough currency to buy 4 million tons of iron ore outside Germany, but fear that their orders will come too late on the list.

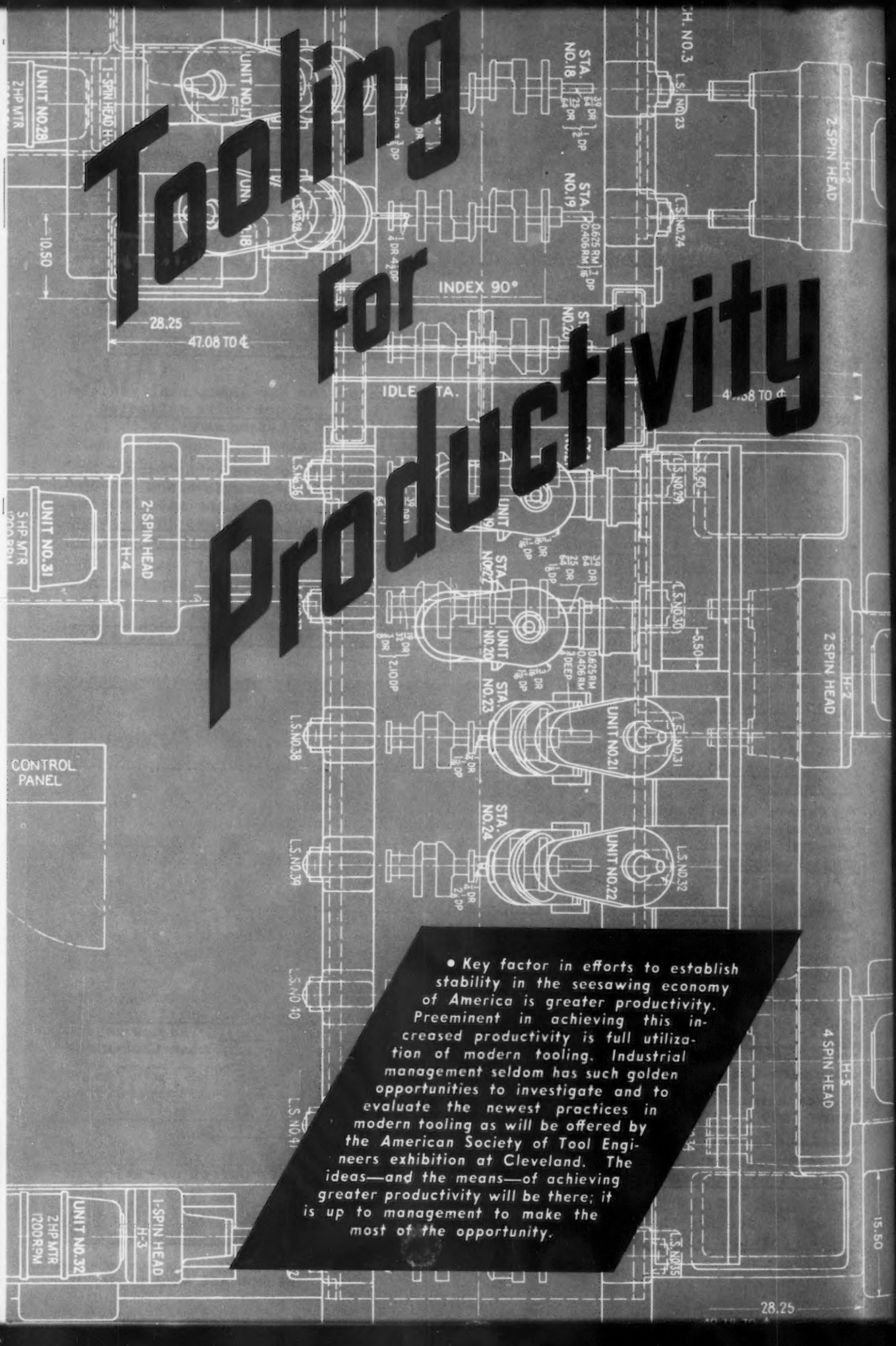
◆ The increased use of powdered metals by the automobile industry is indicated by the fact that the new Oldsmobile Futuramic models have the following parts fabricated of these metals: brake assemblies, main and rod bearings, oil pump gears, clutch pilot bearing and oil pump shaft bearing, rolled bronze clutch and brake pedal bearing and upper connecting rod bushing.

◆ Biggest conspicuous gap in steel distribution last year was the tonnage exported by others than steel mills. A lot of this, estimated at 2 million tons, went at prices up to three times the published mill export prices. The new export regulations, which call for a price on every license application, have thrown the exporters in these deals into a frenzy of wrath and frustration.

◆ Porcelains have been found which can replace metallic alloys at temperatures above 1500 F. They appear to resist creep, but they have not yet been tested for resistance to thermal and mechanical shock in turbine blade service.

◆ Favorable experimental work is reported in development of brass tumbler-type lock, to be produced by powder metallurgy, including cylinder barrel and key with slots formed.

◆ One reason for the snail-like progress of surplus property disposal is the maze of 114 regulations, orders and amendments with which both seller and buyer have to cope.



Tooling For Productivity

• Key factor in efforts to establish stability in the seesawing economy of America is greater productivity. Preeminent in achieving this increased productivity is full utilization of modern tooling. Industrial management seldom has such golden opportunities to investigate and to evaluate the newest practices in modern tooling as will be offered by the American Society of Tool Engineers exhibition at Cleveland. The ideas—and the means—of achieving greater productivity will be there; it is up to management to make the most of the opportunity.

By T. E. Lloyd, *Machinery Editor, The Iron Age*

COMING at a time when the metalworking industry finds itself spread-eagled between heavy demands and constantly rising manufacturing costs, the exhibition of modern production equipment sponsored by the American Society of Tool Engineers, in Cleveland, Mar. 15 to 19, can point the way to the solution of many of the problems arising from this need for greater productivity at lower costs.

On display at the exhibit will be the latest and most efficient production tools of some 250 companies. This elaborate display of equipment gives promise of featuring production speed, faster floor to floor time, greater automaticity of operation, faster processing methods and more complete processing for each individual setup.

Technical seminars, to be held concurrent with the equipment exhibition, will likeise cover the phases of metalworking activity believed most urgent for increased production. These seminars will be held in the main ballroom of the Hotel Cleveland and will begin at 8:00 P.M., Mar. 15, 16, and 17, after the exhibition is closed.

In this drive for productivity, management must acknowledge the fact that the tool engineer is a dominant factor. Instead of being a subordinate

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function, tool engineering must be permitted to assume a prominent position in management councils. The war, with its exorbitant demand for metal goods, brought into focus the heretofore blurred idea that tooling is the controlling factor of production, and the stature attained during the past decade in the industrial economy warrants added responsibility and authority being placed with the tool engineer.

For, in good tooling lies the primary difference between profit and loss, production and bottlenecks, modern and antiquated shops, new business and plant shutdowns, and employee cooperation and dissatisfaction. Plant tooling is physically the responsibility of the tool engineer, but in modern industry the whole concept of the idea is teamwork. Management must realize the value of good tooling and good production methods before any direct action can be taken.

Paul G. Hoffman, president of Studebaker Corp., South Bend, Ind., and head of the Committee of Economic Development, graphically brings out in his article, beginning on page 128, entitled: "Men and Tools," machines because of their enormous productivity, cut costs. As chief executive of a company noted for the modernity and efficiency of its tooling, Mr. Hoffman stresses the point that only greater productivity of industry will sustain and maintain wages, employment, and the entire economy of this country.

Considerable thought is constantly being given to the matter of better organization of tool procurement methods, inventory methods, and disposition control. General Motors Corp., through its Master Mechanics Committee, has developed tool and tooling standards to a high degree, and new tools, methods and operations are under continual examination by this committee. The organization and working procedures of this important function is described in an article entitled, "Tool Standardization Program at GM," starting on page **131.** This article is a factual report to all industry on how standardization programs can be set up.

The job or semi-production shop, as well as mass production plants, can materially benefit from good tooling as evidenced in the article, "The Tool Engineer in the Small and Large Shop," by John W. Matter, of Pioneer Engineering and Mfg. Co., Detroit. Pioneer Engineering, whose president, A. M. Sargent, was the 1946-47 president of ASTE, is both a mass production and short run operation, and Mr. Matter reveals an excellent comprehension of the problems of both management and the tool engineer. While the good tool engineer constantly tries to make do

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• C. V. Briner, director

• C. B. Cole, director

• Karl L. Bues, director

• T. J. Donovan, Jr., director

• A. M. Sargent, director

• H. L. Tigges, director

• Grant Wilcox, Jr., director

● These officers and directors of the American Society of Tool Engineers are largely responsible for the mammoth undertaking of the Tool Engineers exhibition and annual meeting at Cleveland, Mar. 15 to 19.

what he has, too frequently small shop management is inclined to look too long at the initial cost of good tooling and be blind to the long range benefits. The double-barreled approach of this article not only emphasizes the growing importance of specialized tooling in industry, but shows small shop management how better tooling is an asset.

The American Society of Tool Engineers, in arranging its technical seminars, realized the need for better engineering of production in the metalworking industry. One phase of production that will yield an enormous return both production-wise and cost-wise is improvement in material handling techniques. On Monday evening, Mar. 15, a paper, "Work Handling Simplification," will be presented by Allan H. Mogensen, industrial consultant and director of Lake Placid Work Simplification Conference, New York. G. A. Rogers, of Ruden Machinery Co., Ltd., Montreal, will be chairman of the session.

Efforts of the tool engineer in the past have been devoted mainly to increasing output by better tooling and increased machining speeds, but too little effort has been devoted toward greater efficiency in handling materials prior to and subsequent to actual processing. This fact was pointed out by Myron S. Curtis, assistant director of engineering, Warner & Swasey Co., in a paper before a joint session of ASTE and the American Foundrymen's Assn., at the Chicago 1947 Machine Tool Congress. He stated, in part, that "the greatest gain toward greater productivity is to be made by focussing attention on handling time." Inefficient procedures and equipment, as well as outmoded methods, for materials handling are coming under closer scrutinization of mass production industries. This

session on materials handling should disclose new developments and trends in this fertile field.

"Dies: The Control of Deep Draws and Irregular Shapes," is the subject of a paper to be presented at the Tuesday evening meeting. N. E. Rothenthaler, superintendent of production and planning of steel operations, Ford Motor Co., Dearborn, Mich., will be the speaker at this meeting, while the chairman of the meeting will be Arthur D. Lewis, president of Art Lewis Production Equipment Co., Glendale, Calif. Faced with the inability to obtain forgings and castings, many manufacturers have turned to stampings as a substitute for these items. New developments in the field of deep drawing of metals and the effect of these developments on production and costs will be discussed at this meeting. Mr. Rothenthaler is an outstanding authority on sheet metal working and his paper will deal with both the practical and theoretical aspects of deep drawing.

"The Tool Engineers' Quiz," a technical "Truth or Consequences" without the hazing, to be held Wednesday evening, is expected by ASTE officials to be the highlight of the technical sessions. Under the chairmanship of Robert W. Ford, of Ex-Cell-O Corp., and chairman of the ASTE National Program Committee, a panel of experts will answer 25 pre-selected questions and discuss the implications and ramifications of these questions. The panel will include: N. E. Rothenthaler and Allen H. Mogensen, both of whom participated in previous technical sessions, and Emil Gairing, president of Gairing Tool Co., Detroit; E. W. Miller, vice-president and general manager of Fellows Gear Shaper Co., Springfield, Vt.; A. H. d'Arcambal, vice-president and consulting metallurgist, Pratt & Whitney Div., Niles-Bement-Pond Co., West Hartford, Conn.; William H. Oldacre, president, D. A. Stuart Oil Co., Chicago; and James K. Fulks, vice-president in charge of manufacturing, Ex-Cell-O Corp., Detroit. The ASTE National Program Committee selected the 25 questions from those sent in by the ASTE's members.

The annual banquet will be held in the ballroom of the Hotel Carter on Thursday evening, Mar. 18, with James D. Mooney, president and chairman of the board of Willys-Overland Motors, as the guest speaker. Mr. Mooney was affiliated with General Motors from 1921 until 1946 except during the period from 1941 to 1945 when he served with the Navy. A Lieutenant-Commander in the Naval Reserve, he became head of the Production Engineering Section of the U. S. Navy Bureau of Aeronautics. He also served in the Advanced Base Division and was promoted to the rank of Captain in service with the 11th Amphibious Force in England. He later became a member of the staff of the Chief of Naval Operations.

During his service with General Motors, he was primarily affiliated with the company's export division and established the overseas operation which consisted of several manufacturing plants and about 25 semi-manufacturing and assembly plants all over the world. In January, 1946, Mr. Mooney resigned from General Motors to accept the chairmanship and presidency of Willys-Overland.

A series of plant tours has been arranged, designed to disseminate information and help increase production. The plant tour schedule is shown in the accompanying table. The exposi-

Plant Tour Schedule for the ASTE Convention

1:00 P.M.
Warner & Swasey Co.
Ohio Crankshaft Co.
White Motor Co.
Fisher Body Div., General Motors Corp.
Jack & Heintz Precision Industries, Inc.

Thursday, 9:00 A.M.
National Acme Co.
White Motor Co.
General Electric Co., Nela Park
Weatherhead Co.
Reliance Electric & Engineering Co.
Jack & Heintz Precision Industries, Inc.

1:00 P.M.
Warner & Swasey Co.
Ohio Crankshaft Co.
Fisher Zody Div., General Motors Corp.
NACA Laboratories

Friday, 9:00 A.M.
General Electric Co., Nela Park
Weatherhead Co.

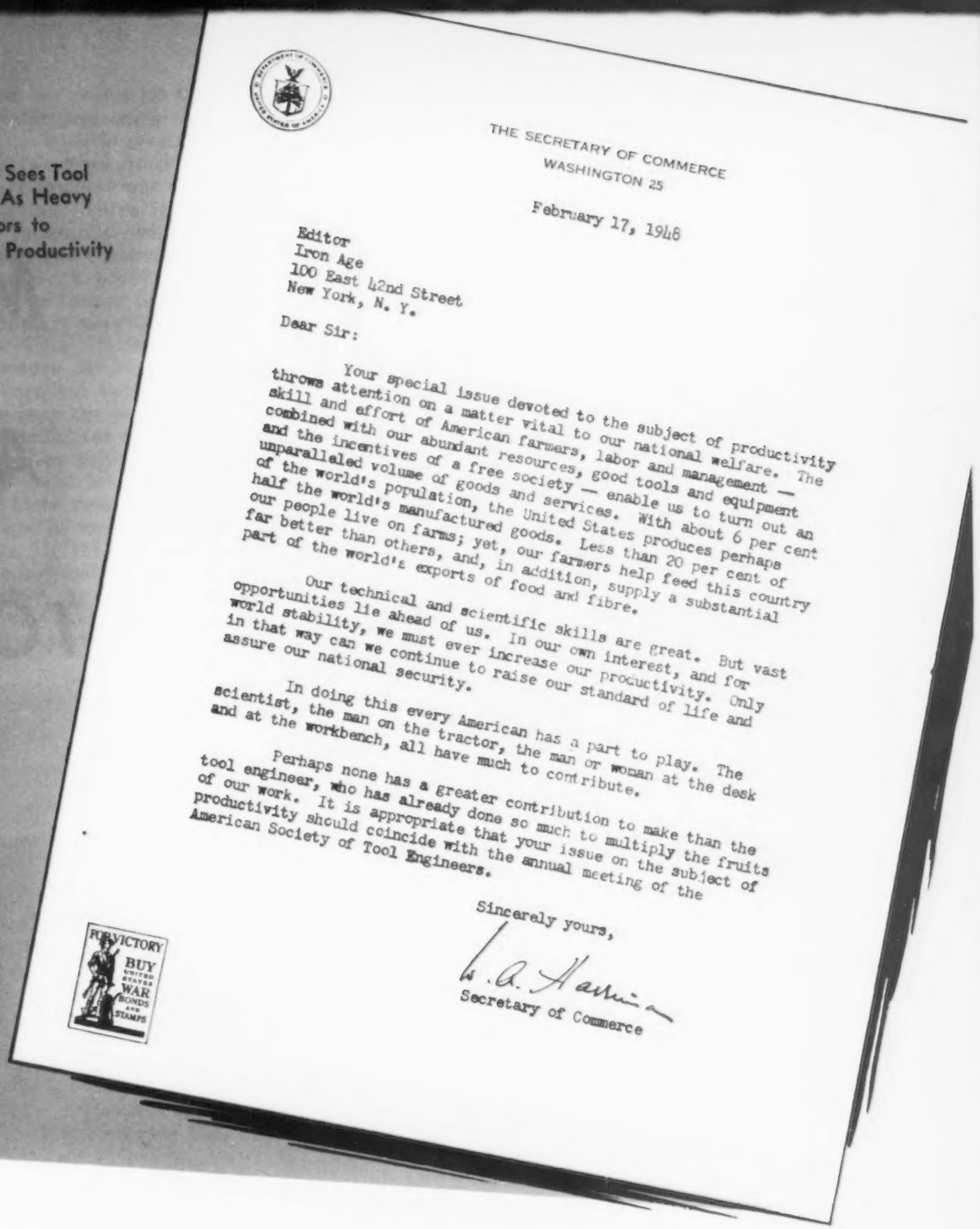
Monday, 1:00 P.M.
Warner & Swasey Co.
Ohio Crankshaft Co.
White Motor Co.
Fisher Body Div., General Motors Corp.

Tuesday, 9:00 A.M.
National Acme Co.
White Motor Co.
General Electric Co., Nela Park
Weatherhead Co.
Reliance Electric & Engineering Co.

1:00 P.M.
Warner & Swasey Co.
Ohio Crankshaft Co.
Fisher Body Div. General Motors Corp.
Republic Steel Corp., Strip Mill

Wednesday, 9:00 A.M.
National Acme Co.
General Electric Co., Nela Park
Weatherhead Co.

Harriman Sees Tool Engineers As Heavy Contributors to Increased Productivity



THE SECRETARY OF COMMERCE
WASHINGTON 25

February 17, 1948

Editor
Iron Age
100 East 42nd Street
New York, N. Y.

Dear Sir:

Your special issue devoted to the subject of productivity throws attention on a matter vital to our national welfare. The skill and effort of American farmers, labor and management — combined with our abundant resources, good tools and equipment and the incentives of a free society — enable us to turn out an unparalleled volume of goods and services. With about 6 per cent of the world's population, the United States produces perhaps half the world's manufactured goods. Less than 20 per cent of our people live on farms; yet, our farmers help feed this country far better than others, and, in addition, supply a substantial part of the world's exports of food and fibre.

Our technical and scientific skills are great. But vast opportunities lie ahead of us. In our own interest, and for world stability, we must ever increase our productivity. Only in that way can we continue to raise our standard of life and assure our national security.

In doing this every American has a part to play. The scientist, the man on the tractor, the man or woman at the desk and at the workbench, all have much to contribute.

Perhaps none has a greater contribution to make than the tool engineer, who has already done so much to multiply the fruits of our work. It is appropriate that your issue on the subject of productivity should coincide with the annual meeting of the American Society of Tool Engineers.

Sincerely yours,

W. A. Harriman
Secretary of Commerce

FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

tion itself will be the largest one ever held by ASTE. This industrial fair might well be considered an educational laboratory since exhibitors will show in operation the latest in tools and processes and visitors will have an opportunity to discuss the merits and advantages of any of these exhibits.

The combination of the technical meetings and the exhibition is directed toward materially assisting industry in its production problems. Tool engineers are the key to increased plant production and increased productivity. The aim of the ASTE show is to acquaint the nation's tool engineers and industrial management, with the developments which will help them do the job that recent economic conditions dictate.

Paul G. Hoffman, president, Studebaker Corp.

MEN AND TOOLS

American industrial growth can be directly attributed to the substitution of machines and tools for hand skills, thereby increasing vastly the productivity of each worker. By so doing, employment and wages increased, while finished goods became lower in cost, higher in quality and greater in number. Productivity is the keystone of the American economy and greater productivity means a stronger economy.

By PAUL G. HOFFMAN

President, The Studebaker Corp., South Bend, Ind.

IN 1870 the average Studebaker worker building wagons and carriages earned $9.60 (or $16.56 in 1947 dollars) for a 60-hr week. In 1947 the average Studebaker worker, making automobiles, received around $60 plus bonuses for a 40-hr week.

What accounted for the difference?

Tools and machinery!

Why is it that America, with only 5 pct of the world's land area and only 6 pct of the world's population owns 47 pct of all radios, 49 pct of all telephones, 72 pct of all automobiles? Why is it that this country has won for its people the highest living standard in the world?

The answer, of course, is mass production—and the machine tools that made mass production possible.

There was a time when the finest of material things used by man were made by human hands, by workers toiling long hours, long days, long weeks. Today the material things in which we take such immense pride come from rows of machines, from presses and drills and lathes and cutters. These robots do everything that human hands can do—and better.

At the turn of the century the head of the Studebaker company remarked that in the early days it had taken the firm a week to build a single vehicle. He was jubilant in 1900 that the company was turning out a horse-drawn vehicle every two minutes.

Today a complicated vehicle of steel and

fabric and rubber comes off the assembly line at a rate greater than one a minute. The modern automobile, built to precision standards, is put together far more quickly than the most handsome carriage ever was even in the heyday of its production. There it is—preceded and followed by thousands like it, each a masterpiece of design and construction. The automobile which once cost $5000 today sells for only a fraction of its former price, and is in every sense a finer, more beautiful and more serviceable vehicle.

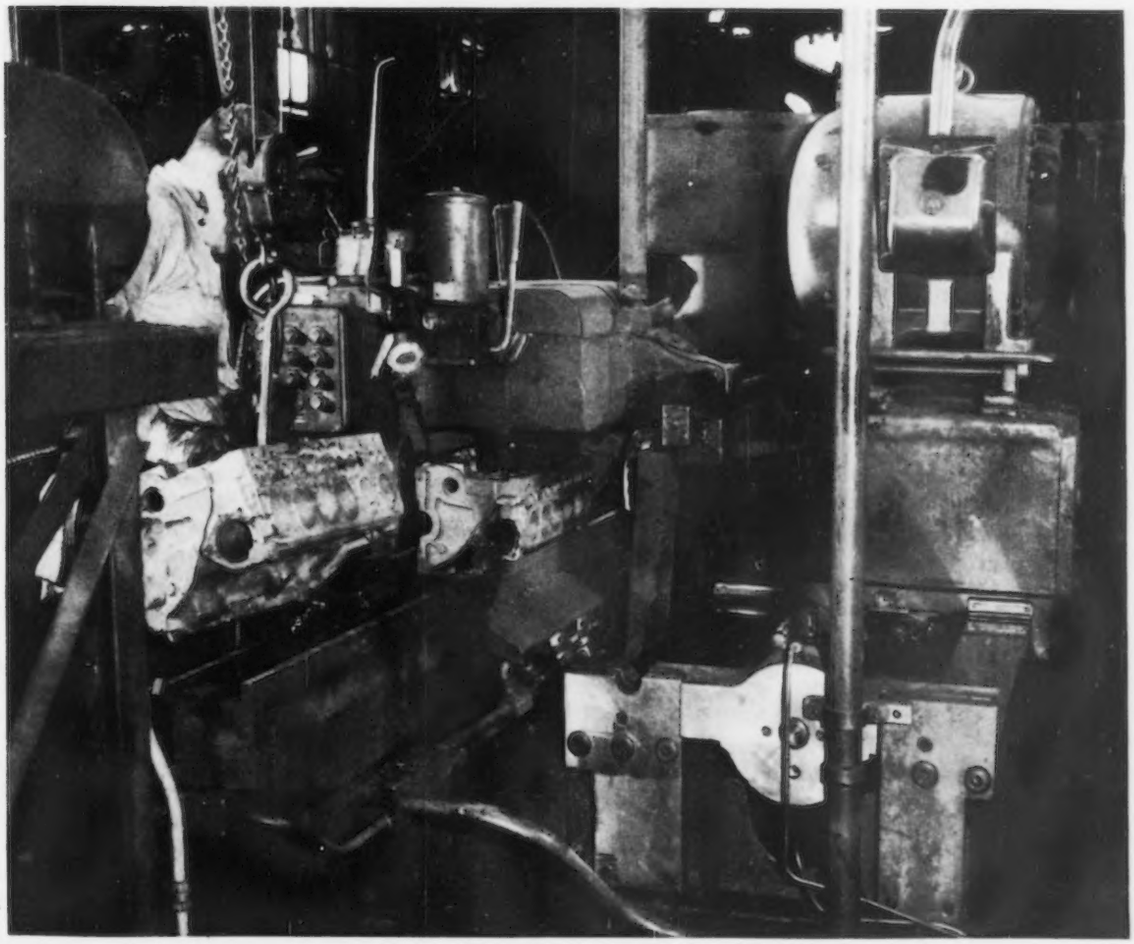
Why? Because machines and tools enable workers to turn out automobiles by the thousands rather than the hundreds. It would take a skilled tinsmith, for example, 8 hr to make such a simple item as the top of a gasoline tank by means of hand tools. A $45,000 machine, operated by three men, can turn out 180 gasoline tank tops in an hr—at a cost of about 2½¢ a piece. If the tinsmith were paid the same basic hourly rate as each of the three machine operators, he would receive $11.92 for making a single tank top, a sum which would, of course, represent the labor cost for just one such item. If an entire Studebaker Champion passenger car were built on a similar basis, the car would cost more than $50,000! Few people could afford an automobile at such a price.

In our machine shop a single transfer-type machine will take an engine block as it comes in from the foundry and at a rate of 60 units an hr rough and finish mill the bearing lock surfaces, the manifold and cover face, the top and bottom surfaces. Can you imagine how many men would be needed to perform precision work like that by hand and turn out 60 blocks an hr? The cost would be utterly prohibitive.

Once upon a time a fabric cutter would laboriously carve out a pattern of seat upholstery from a single layer of material. Today a cutting machine guided by one operator can knife through 60 layers of fabrics simultaneously. It requires little imagination to realize that such quantity production means lower costs for seat fabrics.

The foregoing are only a few isolated examples. What has happened in the automobile industry has happened throughout our industrial empire. Machine tools have increased out-

Typical of the modern production methods used at Studebaker is this milling unit in a transfer type motor block machining line.



put, have improved quality, have reduced costs so that more people could buy the things turned out by the machines. And as productivity increased, so did wages and employment.

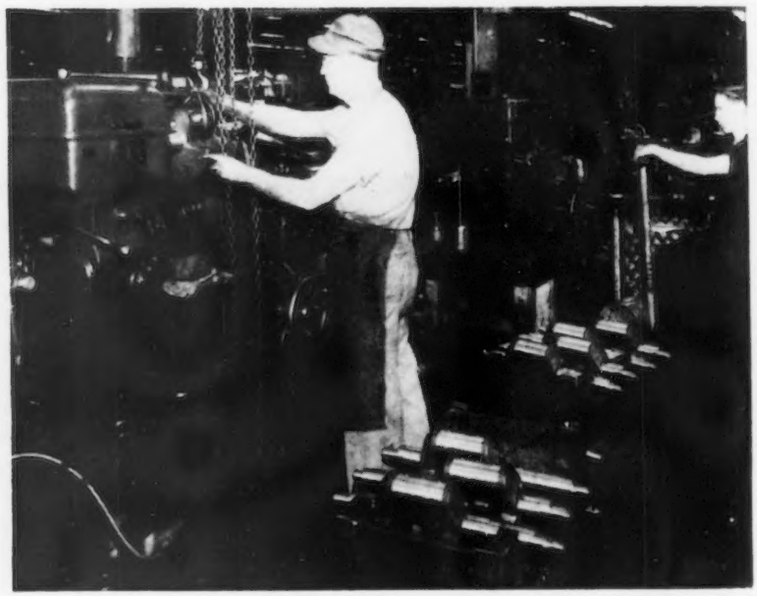
A hundred years ago the investment in machine equipment for each American industrial worker averaged around $500, according to U. S. Census Bureau estimates. In 1946 the investment was almost $7000 per worker, and the worker's income had increased to about ten times what it was a century ago. Production had increased so enormously that prices of many manufactured goods were only a fraction of what they were a hundred years back. One commodity, in fact, was 83 1/3 pct cheaper.

Machines and machine tools long ago repudiated the charge that their use would bring about long-range unemployment. It was true, of course, that as machines replaced hand labor certain workers found themselves temporarily out of work. But over the years it has been proved again and again that where one job had existed and been eliminated, a half dozen others sprang up in its place. The automobile business meant an end to the livery stable and the jobs associated with it, but instead of throwing men out of work over the long run it created thousands of jobs that had never before existed. In 1899 there were only 2200 men employed in the automotive industry. In 1947, more than 960,000 workers obtained their livelihood in automotive manufacturing plants. It is estimated that employees in direct automotive manufacturing and in jobs created through the sale, service and use of motor vehicles numbered more than 8,000,000, or one worker in every seven employed in the United States.

Back of all this lies the simple fact that a man's wealth is not something he inherits, but something that he produces. As he adds to the value of the raw materials out of which he makes things, wealth is increased. And as wealth is increased, a greater share of it is passed on to the worker through higher wages. Machines, because of their enormous productivity, cut costs. As costs are cut, prices decline and more people can buy the things produced. More jobs come into being.

It is a dramatic cycle which has been repeated time and again, and this nation perhaps above all others has hitched its economic destiny to it. What a gigantic contribution machinery and tools are making toward the fulfillment of that destiny!

Notched Skid Bins Solve Crankshaft Handling Problem



SUBSTANTIAL savings in handling crankshafts and other odd-shaped machine parts both in process and storage have been realized by the notching of skid bins to hold the pieces solidly in place.

Notches cut in the sides of bins, as shown in the accompanying photograph, hold the shafts firmly and prevent them from striking and damaging one another in transit. The use of deep bins accommodates the odd size of the pieces and offset projecting corner reinforcement angles enable nesting of the skid bins four or five deep, without danger of toppling or side slipping, for more efficient storage and transportation.

Process savings have been realized in the shop where the system has been applied by allowing the inventory of pieces at each machine to be kept to a minimum, by reducing handling damage, by lessening the time required for handling of the pieces by the skilled machine operator and by the ease with which such bins can be handled by hand truck.

Each machinist has a clamp, shown in the illustration holding the piece being mounted, which he can slip around the crankshaft and over the hook of the crane hoist for moving work to and from the machine. The notched bins hold the shafts in a convenient position for this operation. As the machine operator finishes a crankshaft, he hoists it to a skid bin and takes an unmachined piece from another bin. A shop boy with a hand truck removes the finished bins and returns with bins of work to be processed.

Tool Standardization Program at GM

o o o

By WALTER G. PATTON
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Based on Data Supplied by the Master Mechanics Committee, General Motors Corp., Detroit

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Faced with the tremendous task of screening and evaluating vast amounts of technical information and then disseminating this material to its many and far-flung plants to enable them to keep abreast of technical and commercial developments, General Motors Corp. has developed the committee system to a high degree. This article describes the organization and working procedures of one of GM's key committees, the Master Mechanics Committee. This article outlines accomplishments of this committee, which is responsible for studying and evaluating new tools, methods and operations.

IN a large and decentralized organization such as General Motors Corp., experience has shown that the only practical method of developing standards that will be satisfactory to the corporation, the national standardization bodies, and outside suppliers is the Committee System. The necessity for this type of operation in General Motors becomes apparent when it is realized that GM operates 110 different plants grouped under 54 divisions.

While it should be emphasized that each of the GM divisions operates as an autonomous unit, it is obvious these divisions have many common problems. To provide an organization for collecting, correlating and disseminating data of interest to the operating units and the thousands of technical and commercial organizations with which GM is in constant association, many permanent committees have been established. These include in the engineering field the Master Mechanics, Plant Engineers, Materials Handling, Metallurgical, Plating, Painting, Chemistry and Shop Lubrication Committees, as well as others.

The Master Mechanics Committee, the pattern for which is basic for all the GM operating committees, operates under the direct supervision and direction of the GM Production Engineering Section. This article will discuss the operation of the Master Mechanics Committee.

Specifically, the Production Engineering Section (and the Master Mechanics Committee) is charged with the following responsibilities:

1—Assist in collecting from all available sources data that are pertinent to the selection, specification, purchase and inspection of tools and equipment required for divisional manufacturing operations.

2—Serve as a clearing house for data that may be helpful in the development of national standards for machine tools and equipment.

3—Maintain association with recognized organizations promulgating national standards for machine tools and plant equipment.

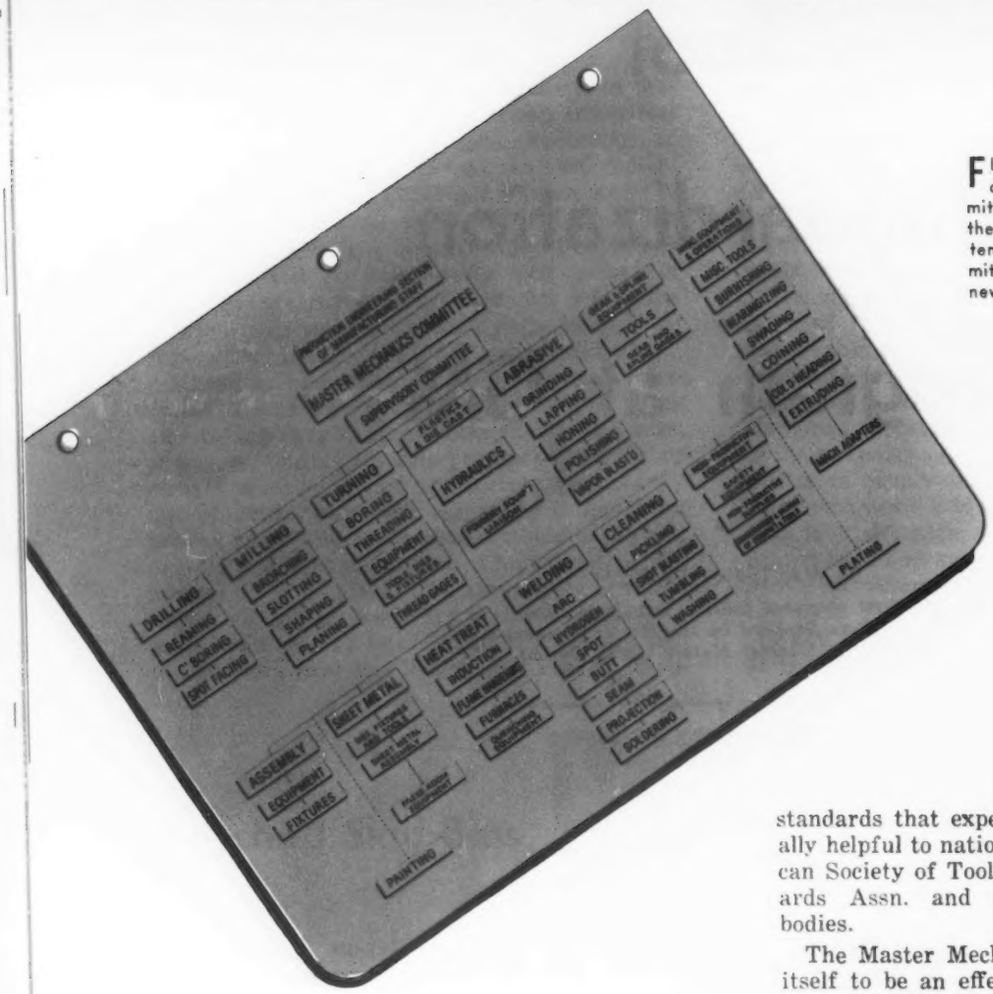


FIG. 1—The organizational chart of the Master Mechanics Committee, showing the functions of the elaborate subcommittee system. The Master Mechanics Committee is directly responsible for new information on tools and equipment.

4—Provide a centralized information service for GM divisions interested in the purchase of certain machine tools or mechanical and electrical equipment.

5—Provide a qualitative reference source describing the many thousands of tools in constant use by GM divisions. This includes dimensions, chemical analysis and other specification details that are accepted as the best divisional and commercial practice.

6—Eliminate unnecessary duplication of similar records in GM divisions.

7—Distribute pertinent production and manufacturing data to the various GM divisions.

8—Furnish sources of tools and parts comparable to standard items but unlisted in published standards.

The advantages of such a committee to GM are apparent. For example, a continuously functioning body with jurisdiction over all GM standards is available where its services are required, either by General Motors' divisions or outside sources.

From the standpoint of GM, this committee serves as an open forum for the exchange of ideas and frank discussion of plant processes, operations and equipment. It can conduct joint investigations leading to the development of standards that experience has shown are mutually helpful to national organizations like American Society of Tool Engineers, American Standards Assn. and similar specification-writing bodies.

The Master Mechanics Committee has proved itself to be an effective and economical method for keeping its members abreast of new designs and production methods. It provides a basis for comparing operating results and research effort that may be extremely helpful in eliminating duplicate research or development work. Because of the broad scope of its efforts, it undoubtedly helps to eliminate unsound manufacturing decisions.

On invitation, the Master Mechanics Committee may function as an arbitration body, resolving differences and bringing about compromises that are mutually satisfactory to the parties involved.

It should also be emphasized that the work of the GM committees frequently extends beyond General Motors. For instance, largely through cooperative effort, Chrysler specifications for most tools are identical with General Motors' standards and carry the same numbers. Packard Motor Car Co. also uses GM standards covering small tools.

Further, through their representatives on outside technical committees and societies, GM committees maintain contact and participate in standardization activities that are national in scope. Under the committee system, all GM divisions have a voice in national activities affecting their interests.

Fig. 1 is an organization chart for the present GM Master Mechanics Committee, including all subcommittees. As indicated in the chart a

Supervisory Committee operates under the direction of Master Mechanics Committee. This committee is comprised of the 14 chairmen of the specialized groups, as Drilling, Milling, Turning, Abrasive, etc. Each major subcommittee chairman is a Master Mechanic of one of GM's manufacturing plants.

The Master Mechanics Committee meets bimonthly and the Supervisory Committee meets on alternate months to consider projects and recommendations of the specialized subcommittees.

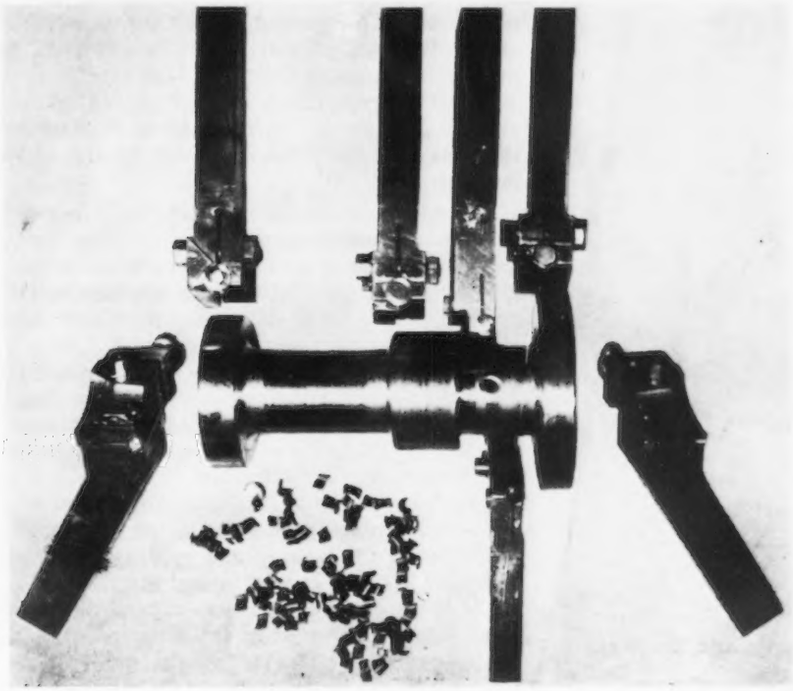
Meetings of the Master Mechanics Committee are held only when scheduled work in subcommittees has progressed to a point where projects are ready for consideration by the committee as a whole.

Interchange of production experience and discussion of manufacturing methods involving the use of machine tools, equipment, fixtures, cutting tools, and the like, occupy the greater part of the committee's deliberations. Where suggestions by committee members warrant further study they are referred to members of the Supervisory Committee for assignment to a subcommittee.

The committee also hears reports from engineers and technicians who have made outstanding contributions toward the development of machine tools, equipment and/or methods. Presentations are usually supplemented by slides or motion pictures illustrating and explaining details of reports.

The Master Mechanics Committee is responsible for new information on tools and equipment added to the GM Book of Manufacturing Tool Standards, Vol. III, which attempts to reduce to standard dimensions, specifications, performance and quality the hundreds of items classified as perishable tools. Sections are also devoted to abrasives, assembly tools, jig bushings, press room tools, etc. Typical of this activity is the present investigation of round carbide turning tools shown in figs. 2 and 3.

At the present time, there are approximately 1800 copies of these standards in use, of which 1200 are being supplied to GM divisions. Practically all units comprising the automotive industry subscribe to one or more copies of the GM Tool Standards book. In addition, many tool manufacturers subscribe to this publication and



LEFT

FIG. 2—This transmission part was machined with round carbide tools mechanically fastened in special tool holders. The speed of machining, and the life per grind and per tool itself appears to herald a new technique in cutting tools.

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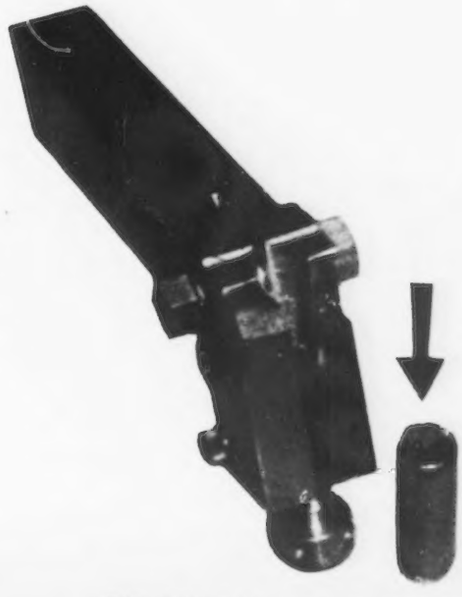
BELOW

FIG. 3—The carbide round (arrow) is reported to outlast conventional single point turning tools 12 to 1. One round tool will last as long as 12 conventional tools and a single grind of this round tool is equivalent to 12 grinds of conventional single point tools.



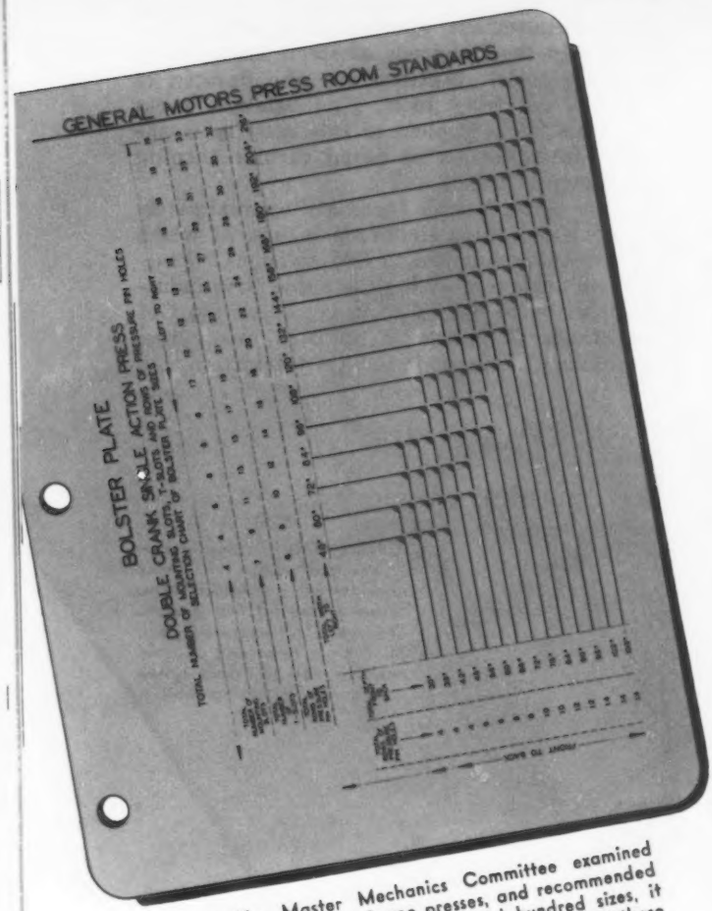


FIG. 4—The Master Mechanics Committee examined specifications for gap frame presses, and recommended standardization of plate sizes. Several hundred sizes, it was found, could be reduced to about 75 sizes if these recommendations are accepted.

some include GM Tool Standards and Numbers in their catalogs.

The Supervisory Committee comprised of chairmen of subcommittees has the following responsibilities: 1—Assign projects to subcommittees; 2—examine and approve all subcommittee reports; and 3—prepare the agenda for meetings of the Master Mechanics Committee.

Subcommittees are naturally selected with full regard for their specialized knowledge of the project involved and are organized according to similarity of products, production methods, equipment, etc. Membership is by recommendation of the subcommittee chairman.

The primary function of the subcommittees is to develop projects assigned to them and to prepare written reports on the completion of an assignment. Subcommittee meetings are rotated among member plants.

Activities of all committees and subcommittees are correlated through the GM Production Engineering Section which notifies members of pending meetings, prepares and distributes minutes of main committee meetings and conducts surveys of GM divisions to obtain information relative to projects being considered. This section is responsible for the publication and distribution of all GM Standards except car product engineering standards.

The Production Engineering Section also arranges for joint conferences with industry when it seems advisable to promote wider acceptance of GM standards. Examples of standardization resulting from joint industry conferences are machine tool electrical standards, press room equipment standards, hydraulic controls for machine tools, carbide tipped tools and straight shank drills.

A brief resume of some outstanding developments by the GM Master Mechanics Committee and its related subcommittees are:

Sheet Metal Committee: In cooperation with industrial manufacturers and mechanical press builders, standards are in process of development for the purpose of promoting interchangeability between presses of different makes, improved interchangeability in GM plants in the event of a press breakdown, improved accuracy and die alignment. Many of these recommendations have already been adopted in the newest press designs.

Miscellaneous Equipment and Operations Committee: Development of a new adapter for use on milling, drilling and boring machines to facilitate rapid changing of tools in machine spindles and minmize possible damage to machines resulting from careless removal of tools.

Plastics and Die Cast Equipment Committee: Joint divisional investigation to improve quality, speed of production and service life of plated or painted die castings and reduce production and maintenance costs and failures in service.

Shot Peening and Cleaning Equipment Committee: Develop factual data on comparative overall costs of cleaning and peening operations, including maintenance of equipment.

Other projects completed or pending include steel vs. cast iron shot for shot peening and cleaning; standards on single point carbide tipped tools; investigation of precision-cast dies; turning and boring; carbide dies; and conservation, utilization and salvage of tools and equipment.

Through experience, GM has learned that its efforts to develop standards sometimes bring to light entirely unexpected situations. For example, the GM Master Mechanics Committee, investigating gap frame presses, learned recently that US press manufacturers were offering several hundred different press sizes to industrial users. Plate sizes were being offered in increments as small as ¼ in. from left to right and from front to back. A detailed study of industry's needs indicated that these several hundred sizes could be reduced to approximately 75, thereby permitting the use of mass production methods by the press manufacturers. Recommended sizes are shown in fig. 4.

As another example of its accomplishments in the development of standards, the GM Production Engineering Section has recently developed tentative hydraulic standards for industrial equipment. At the time this work was undertaken, no standards were in existence covering hydraulic equipment. Wiring circuits, hydraulic

controls, pumps, oil reservoirs, valves and accessories were left entirely to the discretion of the individual manufacturer. As a result equipment users found themselves faced with high maintenance costs and excessive inventories of equipment. The index page of a publication covering the GM tentative hydraulic standards for industrial equipment, showing the items covered in the new standards; a typical page taken from these standards; and new recommended standard symbols are shown in fig. 5.

As a result of 25 years experience in the development of standards, GM counts the following benefits from its activities:

1—Reduction in the number of parts required to carry on operations; 2—lower investment in inventories because of greater interchangeability of parts and equipment; 3—lower prices because of quantity buying on fewer specifications; 4—better workmanship because of full utilization of mass production methods; 5—facilitation of inspection, and 6—simplication of service problems.

Experience has shown that industry, too, can benefit from the development of well-considered workable standards. For this reason the GM Production Engineering Section is constantly soliciting the cooperation of industry and producers of plant equipment in working out its projects. At the present time, for example, close liaison is being maintained with producers of hydraulic equipment to finalize the present tentative hydraulic standards for industrial equipment. Cooperation is also being sought—and welcomed—from other industry sources where projects of mutual interest to General Motors and outside manufacturers are already in progress or have been projected for the future

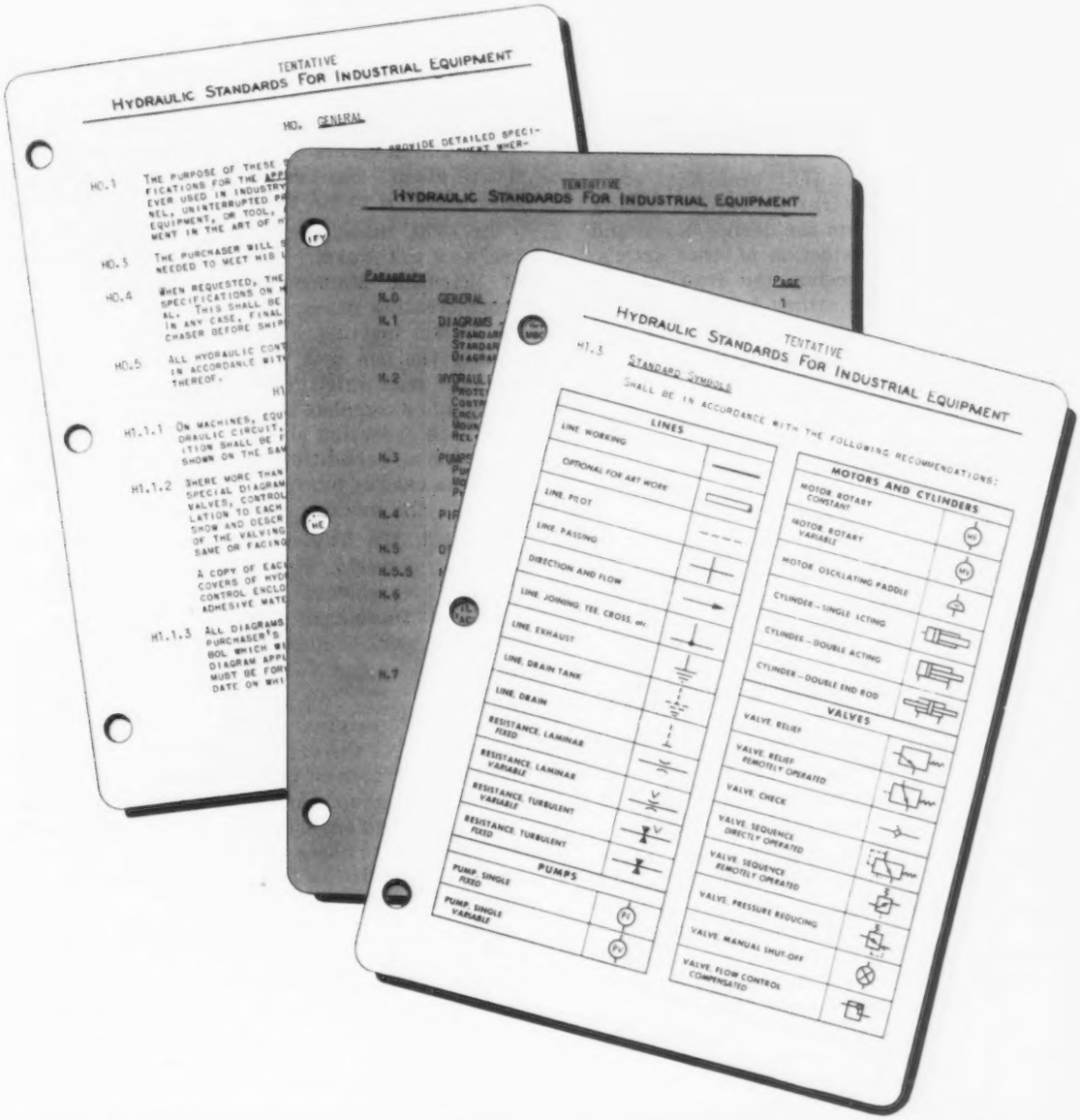


FIG. 5—At left is a typical page taken from the new GM tentative hydraulic stands for industrial equipment; center is a view of the index page of this manual; and right are recommended standard symbols for hydraulic equipment.

The Tool Engineer

Highlighting the nationwide drive for greater productivity is the growing acknowledgment of the tool engineer as a keystone in the management-production team. This article recounts, in a nunderstanding vein tinged with humor, the development of tool engineering as a profession, with particular emphasis on the distinctions between the activities of the tooling supervisor in mass production shops and in the smaller job or semi-production shops.

TOOL engineering is that branch of engineering which concerns itself with taking a product fresh from the design board and tooling up for mass production of that article. When a tool engineer receives the drawings, he will generally follow this rather definite path.

1—Analyze the proposed creation and recommend design and/or material changes that will facilitate production or tend to limit costs.

2—Determine the method of manufacture, write procedure sheets, layout sequence of operations, specify machinery required, and tools and gages needed. Also, if necessary, inspection procedure will be determined and specified.

3—Make necessary plant layouts of machinery and equipment required, and determine what material handling facilities are needed.

4—Design necessary tools, jigs, fixtures and dies.

5—Design any special machinery and handling equipment needed.

6—Supervise construction and tryout of special tools and equipment.

7—Supervise installation and incorporation of special facilities into the manufacturing setup.

The tool engineer is a specialist who bears about the same relationship to a mechanical engineer as does the specialist to a general practitioner in medicine. All functions now handled by tool engineers have been handled in some manner for hundreds of years; however, the trend toward the present degree of specialization started some 40 years ago and crystallized into its present status during the recent war. That war could not have been brought to its early and successful conclusion without the aid of the skilled specialists who make up the ranks of the tool engineers. The modern tool engineer owes the development of his importance to the need, as much as any one thing, for interchangeable parts in the manufacture of the modern automobile.

Starting with the Revolutionary War, men in every American war have agreed to manufacture, and did manufacture with some success, rifles and muskets with interchangeable parts. There always has been a need for interchangeable parts; it is not new.

In 1895, modern manufacturing got its first real shot in the arm. Fred W. Taylor, the Father of Scientific Management, presented his first epoch-creating paper, "A Piece-Rate System," at an ASME meeting. He stressed the need for finding the one best way to do a job, and the need for stop watch timing each motion element going into a complete operation. He also stressed that each operation should be provided with the best tools and conditions suited to it. This paper indicates exactly much of the work that has since fallen to the modern tool engineer.

In 1903, Mr. Taylor presented another great paper to the world, "Shop Management." He advocated and showed the advantages of functionalized foremanship. His thought was to divide the work of management so that each man would have as few functions as possible to perform.

In Taylor's original system of functional control of work in the shop, functions were divided into those performed in the office and those performed in the shop. As shown in the illustration, each worker had six specialists to advise and help him, one man to check and inspect his work and one man to advise as to his own conduct and, if necessary, to discipline him.

In this system may be recognized the essentials of every planning system, and the nucleus around which modern tool engineering developed. Since Taylor's time, there has been a gradual evolution in functional control, so that while his plan represents the principle, this principle is now carried out in various ways.

The late Henry Ford was responsible, more than any one man, for modern development of interchangeable parts manufacture. Ford first visualized, conceived and developed the low

Mass Production

Vs

Small Lots

o o o

By JAMES K. MATTER
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o o o

priced automobile for the masses. Ford brought to this country the Johansson gage blocks, forerunners of most modern gage blocks. Without gage blocks, it would be nearly impossible to make cheaply, parts to the fine limits and tolerances in use today, and have them absolutely interchangeable.

Ford's initial plan was essentially simple, but working out the details became more complicated. He started with the design of a car suited to the average pocketbook, and proposed to make this car available to the world. At that stage of development, he had several main problems to be solved.

1—The parts of his car had to be made cheaply from good materials. That meant they had to be made fast.

2—Individual parts had to be interchangeable, and go together without excessive filing, fitting and scraping. Every part had to fit every car.

3—Finished parts had to be assembled rapidly into finished cars.

Existing machines were inadequate for mass production of automobiles. Drill presses, for instance, were called on to drill 40 holes in one operation. New machines had to be designed to perform the many tasks demanded of them. High production jigs, fixtures and tools were required in a never-ending stream. New type, adjustable-speed conveyors were needed.

The world had special machines, jigs, fixtures, dies, conveyors and mass production before the evolution of the automobile. It was the automotive engineer, however, who took existing tools and methods, chose those best suited, and came up with that new common miracle of manufacturing known as straight-line, interchangeable parts mass production. Others had used automotive production methods, but this industry used them all and created new ones.

Fred Taylor visualized functionalized management and workers. The automobile manufacturers made Taylor's vision come true in a big way.

Automotive expansion programs reach for the ideal of complete mechanization of all possible operations. Let the machine do it and, preferably, let it do it automatically.

The initial program of the new industry required, as was stated, new special machines, elaborate mechanical handling mechanisms, new tools without end. It needed men who knew tools—tool engineers—to visualize, design, build, and put them into use, iron out the bugs, and then synchronize them with companion tools.

Automobile manufacturers couldn't find tool engineers so they made them to order, training them in their own trade schools and creating them from the ranks of tool makers and mechanics. Men trained to make and try out dies, for example, can learn to design new dies once they learned the conventional method of detailing them on paper. Thus, a new avenue of promotion became readily available for the capable and enterprising shop man who desired to advance.

Men who knew machines and tools were needed for another phase of the work. Each part had to be analyzed and decisions made as to how it was to be made, on what machines, at what rates of production, and with what tools. Processing parts became a science. Many of the first process engineers came from the ranks of the shop men, and many still do.

The continually expanding needs of this dynamic field which made it clear that a new type of specialist, namely the tool engineer, was essential to industry. Not only did the automobile manufacturers need them, but their suppliers, who were being called on to furnish increasing quantities of parts at decreasing prices, either had to hire or develop their own brand of tool engineers. The reason was simple. Tool engineers meant better tools, more efficient methods and lower costs.

In seeking data for this article, dozens of existing organizational charts of manufacturing concerns as they exist today were inspected. Because products manufactured and services rendered by these companies are so dissimilar in nature, their organization charts cannot be too closely compared. The automobile companies, for example, favor the title *Master Mechanic* for the individual whose department takes care of the main tool engineering functions. Another type of company puts these same functions under the title of *Chief Industrial Engineer*. A third type of company centers the same functions in a *Manufacturing Engineering Superintendent*. A fourth type of organization allots tool engineering plus other functions to a *Superintendent of Production Control*. On charts, those four individuals appear to have charge of four entirely dissimilar organizations. If examined carefully, however, it will be found that they all hold essentially the same job. Each has to determine how a part is to be made, where it is to be made, and with what tools.

HE CAN DREAM CAN'T HE ?

The tool engineer goes to work when the customer's inquiry arrives. Whether the inquiry is for ten or a million parts, an estimate of the amount and cost of tooling required is of prime importance. In many cases, inquiries come from

a distance and exact details are not known at start of negotiations. In that case, the tool engineer draws on his experience, never forgetting the axiom: *Use standard tools where possible.*

If the quantity of an inquiry or order is small, the tool cost is often a greater item than the cost of the finished parts themselves. The design engineer may conceive the part built in one piece on a special die. The tool engineer may see a method of making a weldment in five pieces on standard tools, resulting in a cheaper product. For this reason, design engineers and tool engineers are working closely together these days.

When the order arrives, the chief tool engineer inspects the proposed design with the chief designer before work is started. Design may call machined bar stock, while tubing may be cheaper and can be readily substituted. Stampings may economically replace forgings, or drop forgings might replace malleable castings. Coordination between design and tool engineers is desirable.

The tool engineer in the small shop is more necessary to the success of the business than the tool engineer in a large shop, but he has a wider scope of activity. A large plant has many tool engineers. A small plant will probably only have one, and, in a very small shop, the tool engineer will be the owner himself.

In a large plant, the work of tool engineers is highly functionalized. A die designer will design nothing but dies; a jig and fixture designer very often is unfamiliar with progressive dies and will never be asked to design them. There is always at least one tool engineer who designs nothing but cams for automatic screw machines.

Small plants have neither the capital nor the resources of larger companies. They are dependent upon the ingenuity and resourcefulness of one or two individuals with standard tools.

The main problems in tooling faced by both large and small plants are essentially the same. Both take a newly-designed product, consider the quantity to be manufactured; and from resources available, determine the tooling.

THE TOOL ENGINEER IS ALWAYS COST CONSCIOUS

A large plant would buy a planer to surface a cast iron plate. The tool engineer in a small plant would scheme out a way to surface that plate on the cheaper shaper by rigging an extension to his shaper head and using two tools.

The large shop depends on jig borers and jigs. The small shop handles the job with micrometers and templates. The small shop engineer usually cannot buy single purpose machines, because they are too much of a liability.

In the small shop, each machine must extend itself to the breaking point. A lathe substitutes for a horizontal boring mill; a horizontal milling machine is, in turn, a saw, a boring machine, a jig borer, a spur gear cutter, a helical gear cutter or a small planer.

Large shops have cylindrical grinders. Small shops mount hand air or electrical grinders on the carriage of a lathe and accomplish the same result. Large shops buy special spotfacers for every hole, while small shops must use homemade adjustable tools of the fly-cutter type.

The drill in a small shop really takes a beating. It drills, reams, counterbores, laps internally, and laps plane surfaces. With a saw mounted on the end, it becomes a slitter and an excellent aid to produce castellated nuts. It did all the machine tapping for a hundred years and it makes an excellent arbor press.

With a little encouragement, the drill will really show its extreme versatility. It becomes a vertical boring mill, and substitutes quite nicely for either a vertical or horizontal milling machine. It makes an excellent punch press and readily converts into a spinning lathe. With the addition of a milling machine vise, it really becomes flexible and functions as a keyway machine, handling end, mid-shaft, or Woodruff keyways with equal facility. It also is an excellent router in aluminum, magnesium or brass. As a matter of fact, a drill press can, in a pinch, do anything except vote.

The lathe, the milling machine and the shaper are other machines that are called on to perform minor production miracles in the small shop. It is true, that at times, all small shop machines are forced to handle jobs for which the manufacturer would never recommend them, but the engineer who has the responsibility of getting out the work seldom stands on ceremony.

Many radical improvements in manufacturing processes and developments in techniques were first discovered in the small shop under the stress of necessity. The large plant looks to the tool engineer to design machines, tools and handling mechanisms of exceptional capacity and ingenuity. It wants the last word and the best—tomorrow's creation, today.

The small shop expects its tool engineer to exhibit exceptional ability and ingenuity in adapting standard tools to the job on hand. It wants genius exhibited in the flexible use of equipment in the shop and tools in the crib, and not in discovering new equipment to purchase.

In both the large and small shops, the tool engineer is cost conscious. The moment a tool program is completed and turned over to production, the tool engineer starts analyzing shop

costs of machined parts. However good the tooling was, those parts can be made better, cheaper and faster.

Tool engineering in the large shop is well functionalized within its own ranks. The tool-designer sticks to his drawing board; the process engineer sticks to his board or desk; the tool try-out and trouble man is also a specialist who works in the shop a great deal of the time. These functions are often broken down even finer.

When the drawings of a machine or product with the corresponding details reach the chief tool executive in a large shop, they are studied in detail. Invariably, a time and cost estimate

ESTIMATING IS SOMETIMES CRYSTAL GAZING

is wanted. This means an estimate covering:

(1) Time required to design all the tools needed; (2) Cost necessary to build these tools; (3) Time required to build all tools needed; (4) Factory cost of the component parts of the product and an estimated cost of the finished product and, (5) Hourly production rate on all parts and finished products.

These estimates, always demanded before the tools are designed, mean that some tool engineer or group function as crystal gazers or estimators. It is difficult to prepare an estimate before tooling is determined, yet the men who do it acquire a rare degree of proficiency and are surprisingly close to actual results in their guesses.

The number to be made and the tooling budget determine the quality, extent and type of tooling program. With this information, the estimator makes necessary estimates required and prepares his forecast of time required for completion of the tooling program and eventual factory cost of the finished product.

Assuming the product is elaborate, assembled from many fabricated parts, the tooling program is extensive and elaborate. One of the first matters to be decided is what work the company will do in their own organization and what work will be let to outside contractors. In these days of specialization, no large company handles tool engineering details within its own organization. No large company could afford to retain permanently in its own organization trained tool engineers to handle all their work.

The general plan of procedure is determined within the large company. Some parts will be turned over to their own tool engineers for analyzing and determining just how the parts are to be made on what machines. If the fixtures to be made are not too elaborate, they will be designed by men within the organization. On the other hand, if the parts require a large number of elaborate and expensive dies, that job will be turned over to an outside company to design and make, or to a firm of designing specialists.

The demand for more and more elaborate tools and fixtures in industry has resulted in the formation of innumerable design and engineering companies, nicknamed "job shops," which serve as talent reservoirs for the tool engineering profession. These companies furnish engineering and designing service for all industry at a moment's notice. Because their men work on so many varied types of jobs, they acquire considerable skill and handle difficult jobs that would give trouble to less experienced men.

When the large company turns over designing work to an outside contractor, this work is followed, checked, and approved by their own tool engineers before acceptance. It is their men who are responsible for the success of the program and they are responsible to their own company for the working of the tools they authorized to be made on the outside.

After the new program is completed and conveyors and tools are installed and in place, it is the job of the tool engineer to see that individual tools, jigs and fixtures work properly; conveyors are accurately timed; inspection is comprehensive and accurate; and scrap is at a minimum. It is his duty also to clear up sticking points by finding the remedy before turning tools over to production.

In summing up the position of the tool engineer in the large shop, it would be correct to state that the large shop has its own well-trained corps of tool engineers who specialize on definite functions. For ordinary jobs, they can handle all functions of estimating, processing, designing jigs and fixtures, laying out the plant, handling tool trouble and keeping in touch with new and faster developments. When it comes to a complete change of models, or elaborate programs requiring designing and building of entirely new machines, the majority of the work is done on the outside.

Aware of the importance of his profession in modern industry, today's tool engineer has recognized that responsibilities accompany professional recognition. One of these responsibilities is the establishment of certain standards and the dissemination of information.

Training of tomorrow's tool engineers is another major phase of the education program. Many tool engineers have not had college training in engineering. Developments have been so rapid and specialized that experience was the only teacher. College training in other branches was helpful, but did not produce a tool engineer. The graduate mechanical engineer can have ex-

cellent basic training in mathematics, physics, mechanics, strength of materials, hydraulics, kinetics, thermodynamics and kindred subjects. He may learn something about the development of luder lines in short steel after it has been subject to cold drawing. That is well and good, but, won't answer this question: When luder lines or "worms" develop in a load of metal at press, what should be done to cure them right there and get on with the job? To answer that question requires considerable shop experience.

However, believing that there are many fundamentals of tool engineering easily adaptable to the methods of formal education, ASTE, for example, has devoted considerable effort to the preparation of college curricula on the subject which combines classroom and laboratory work with actual experience. Textbooks have been published on certain phases of tool engineering which are of use not only to students, but to practicing tool engineers. Courses in tool engineering are now offered in several universities and colleges.

The tool engineer's task is to find ways, means, methods, tools and machines to increase production at lower costs; to do it with machines, tools and mechanisms and not at the expense of men's bodies. That is the American way of creating wealth. They term this the Machine Age—actually, it is the Tool Age. The machines only furnish the power; the tools do the work.

Furnace Fixture for Maintaining Welding Preheat

By W. R. PATTERSON
Metallurgist,
National Supply Co., Torrance, Calif.

PRESENT day welding requirements often make it necessary to weld complicated parts using materials that are sensitive to hardening. The adjustable articulated electric welding furnace shown in the accompanying illustration was developed to overcome some of the difficulties associated with such work. While this apparatus was designed primarily to handle a specific item, the principles involved apply to many other welding jobs.

The approximate size of the furnace is 2x2x2 ft, inside dimension. The fixture, mounted on trunnions within the furnace, can be rotated through 360°, which makes it possible for a welder to work on one side of a part and then the other side without turning the furnace upside down. The motion of the furnace itself, rotating on trunnions, allows rotating movement in a direction that is 90° from that permitted by the trunnions inside the furnace. The combination of the two motions permits the point at which any weld is to be made in a part to be adjusted to any desired position. This gives flexibility to the welder and does not interfere with the performance of the furnace. By covering the open segments with an asbestos blanket, thus exposing only the immediate area of the weld, little heat is lost through the open segment and the welder is protected from radiation that would normally result from an open segment.

Although the furnace could be made 3x3x3 ft, such a larger unit would not be practical. It would be too big for efficiency, because the welder could not reach over the unit to get into the work.

The furnace can be successfully used in the handling long parts to be welded on one end. That end could be confined within the furnace while the remainder of the piece could extend through an opening in the end of furnace, packing off the opening with asbestos.

Anyone familiar with welding is aware of the unusually high stresses that may be encountered, particularly where welds are in such a position that they oppose one another. One welded assembly, shown in the lower right corner of fig. 1, has this characteristic. The part, a B-36 bomber wing fitting, is composed of a SAE 4340 steel forging and plates which are welded together in such a way that within the assembly there are single, double and quadruple fillet welds. In addition to the stresses involved in the opposing welds, there are also stresses arising from the variations in thickness, presenting a problem in uneven cooling. Previously, the assembly was preheated by a number of gas torches positioned around the work in such a way that approximately uniform heating was obtained. When a temperature of 600°F was reached, the torches were withdrawn and the welder preceded with the welding.

An assistant would stand by with a temperature measuring device to notify the welder when the part was becoming uneven in temperature or too cool, at which time welding would cease and the torches put into position for further preheating.

Such a method requires considerable integrity of both the welder and assistant, and, even at this, some temperature variation was unavoidable. The very high hardenability of SAE 4340 steel caused the formation of martensite when preheat temperature momentarily fell too low. The formation of this brittle constituent invariably led to cracks in the parent metal adjacent to the welds.

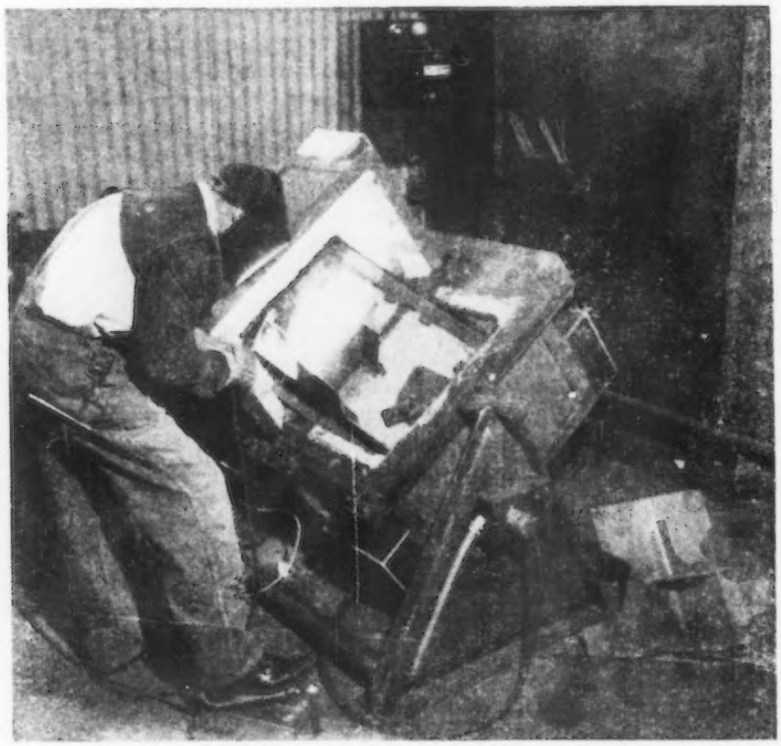
Better control of this process had to be made with the objective of eliminating the formation of martensite and also to control uneven temperatures, in order to decrease the stresses present. The logical conclusion to such an approach was to provide a means of maintaining the temperature of the part at a temperature safely above the M^s point and to maintain it as uniformly as was practical.

The electrically heated furnace is composed of four segments and has a steel fixture to which the part is clamped and which is suspended within the furnace. Each of the four, segments can be removed to allow access to the part within. The fixture as well as the furnace itself can be revolved to obtain the proper welding angle for any of the welds in the part. A thermocouple near the part operates through a controller and maintains to a satisfactory degree the desired temperature in the part.

In order to show in the photograph the part and fixture within the furnace, the asbestos cloth normally used to surround the work and cover the open quadrant of the furnace was removed. This asbestos cloth is thrown over the work in such a way that only the weld on which the operator is working is exposed. Thus, it is possible to maintain the preheat temperature at all times during welding. With the use of the asbestos cloth the welder finds it is not too uncomfortable to work on material preheated to 800°.

The part to be welded is clamped onto the fixture, all segments of the furnace clamped into place, and the power put on to the furnace elements. The controller automatically brings the work up to a preheat temperature of 800°F, or any prescribed temperature, and holds it for a soaking-out period. Welding of the part proceeds by removing one by one the quadrants and revolving the work and the fixture to provide a desired position for welding. After all welding is completed, the part is removed and placed in an annealing furnace where it is slowly brought to room temperature.

This procedure makes it possible to avoid formation of martensite, since any area which has been heated over the critical temperature during welding is only permitted to cool to 800° and held there until such time as it can be reheated and cooled slowly through the critical range. In addition, temperatures during welding are as uniform as possible throughout the part, and less distortion is encountered than previously experienced. In addition, the quality of the welds has improved, because the welder can work with minimum interruption since it is unnecessary to stop and reheat the part during the entire sequence of welding.



o o o

THIS electrically heated furnace welding fixture revolves in two directions on trunions, permitting positioning of the part to be welded. A duplicate of the part in the furnace is shown in the lower right corner of the photograph. Normally, the open section of the furnace is covered with an asbestos blanket.

o o o

New Production Ideas

New tools and better tooling are the foundation to increased productivity, a theme that is emphasized throughout the coming exhibition and meeting of the American Society of Tool Engineers, Mar. 15 to 19, in Cleveland. The following are some of the more recent developments in machines, tools, accessories, fixtures, inspection instruments, and equipment designed to increase production and improve quality.

Horning Press

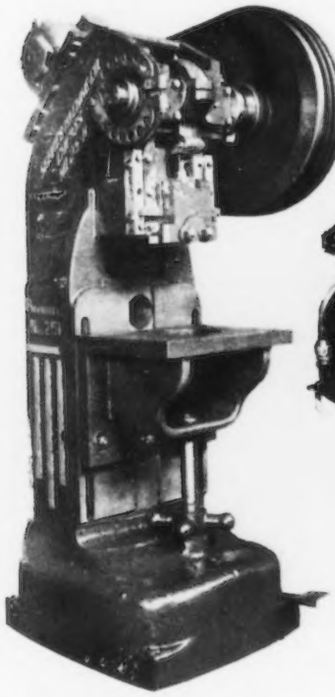
A 25-ton Rousselle horning press features an adjustable bed table that can be raised or lowered to suit the die to be used. It can be raised to 6-in. die space, or lowered to 17-in. die space for large or special die sets. A special bed table will permit a maximum shut die heigh tof 28 in., and the standard bed table measures 14x20 in. with an 8-in. hole. This design permits slugs or blanks to fall through the table without interference from the elevating screw. The bed table can be removed for access to the 4-in. horn hole. The ram is furnished with a standard 1 9/16-in. or a special 2-in. shank hole. All presses have a single stroke attachment and can be changed over to repeat or continuous operation. *Service Machine Co.*, 7627-33 So. Ashland Ave., Chicago 20.

Precision Boring Machine

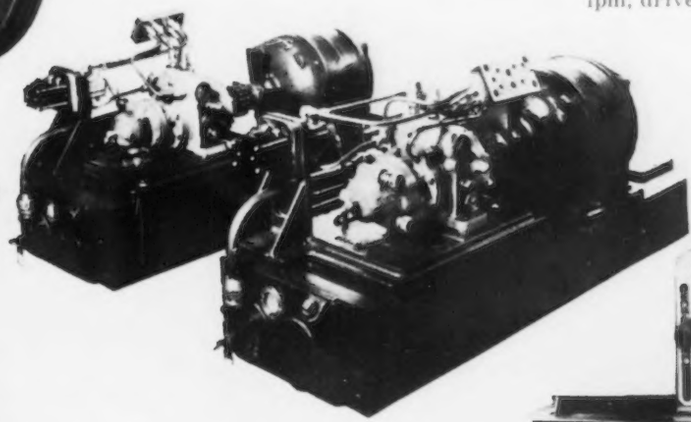
A NEW concept of precision boring machine design features a new table platen construction which increases its capacity, new sealed-lubrication precision boring heads and a new one-piece bed design. The unit type construction in this Simplex 2U 2-way machine, permits modification of the work table to adapt it to a wide range of precision boring applications. The use of moving tables to carry the boring heads permits a wide variation in the weight of work pieces and fixtures without affecting the precision of the machine. The hydraulic systems are assembled as completely self-contained, easily serviced units with all piping carried to one centralized manifold plate. *Simplex Machine Tools Div., Stokerunit Corp.*, 4548 W. Mitchell St., Milwaukee 14.

Plain Milling Machines

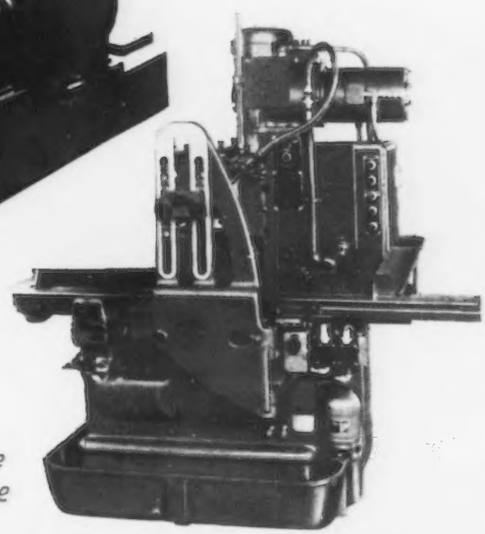
DESIGNED to give more work with fewer setups, this No. 12 plain milling machine permits many milling cycles that require the accurate lowering and raising of the machine spindle in conjunction with the regular table movements. Built with either 3 or 7½ hp spindle drive, spindle head feed rates are available from ½ to 7⅝ ipm, by use of change gears, and they are independent of table feeds. The spindle head fast travel rate is 30 ipm, drive is by a brake-type motor.



Service Machine Co.'s Horning Press



Hydraulic Unit for Simplex Boring Mill



Brown & Sharpe Milling Machine

and dogs operate various electrical devices for controlling the arrangement automatically. Hand control is provided by knobs and buttons. Settings can be made to position the cutter at two different heights in any cycle and to raise and lower the cutter several times during any cycle. *Brown & Sharpe Mfg. Co.*, Providence 1, R. I.

Die Tryout Press

A NEW production-type die tryout press permits trying dies out under actual production conditions, operating up to 100 strokes

per min. The head and bolster can be tilted so that final finish can be made without removing the dies from the press. These presses are made in two models, 40-ton and 80-ton. *Alpha Tool Works*, 6420 Beechton St., Detroit.

Tap Holder

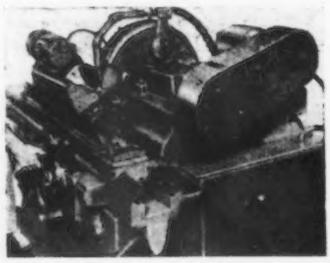
DESIGNED to hold taps and reamers for precision operations, this new holder prevents parallel and angular misalignment by means of a Neoprene insert and a floating ball and socket joint. This arrangement permits the tool to align itself properly with the centerline of the spindle. *Erickson Tool Div.*, 2309 Hamilton Ave., Cleveland 14.

Dividing Collet Head

A UNIVERSAL dividing collet head, used for precision milling and grinding, has two new features. One is the tail stock attachment for better work centering and the other is the lever action collet closer permitting faster opening and closing. The collet head takes up to 1-in. capacity in 5C ground thread collets. It has a sturdy graduated base, hardened and ground spindle, and a 24-tooth index plate hardened and ground within 0.0005-in. spacing. *Matco Tool Co.*, 2834 W. Lake St., Chicago 12.

Grinding Machines

TO provide clearance for larger diameters and projections, Brown & Sharpe Nos. 10 and 12 plain grinding machines are now manufactured with a 10-in. swing. The new 10x18 and 10x30-in. ma-



chines are designed for rapid cylindrical grinding on a production basis and to close limits. The grinding wheel spindle design assures rapid, trouble-free precision grinding. Spark-out time is at a minimum due to small clearance between the spindle and its boxes, practically eliminating radial spindle play. Correct adjustment of the spindle boxes is quickly and positively obtained with the spindle running, and the cross feed mechanism is adjustable to 0.0001 in. on the diameter. *Brown & Sharpe Mfg. Co.*, Providence 1, R. I.

360° Saw Band

A SPIRAL saw band, with a hard cutting edge which spirals around the band, gives a 360° cut-

ting edge so that material can be cut in any direction without rotating the work. The adoption of this blade and the new type rubber roller saw guides permits cutting in any direction with the blade kept in perfect alignment. These blades are available in two sizes, 0.040 in. and 0.074 in. diam, with a 15-tooth pitch. For internal sawing operations, the blades can be welded on conventional butt welders, and they are available in cut lengths or 100-ft coils. *DoAll Co.*, Des Plaines, Ill.

Bar Stock Feeder

CALLED the Pond Production Operator—200, a new milling machine bar feeder performs four hand operations automatically: Opening the vise, ejecting the finished piece, locating the bar for the

next cut, and starting the machine cycle. The control unit operates the mill, but the cutting time required by the miller determines the length of the full cycle. A 1/3-hp electric motor drives the mechanical members of the feeder, which in turn actuate pneumatic parts. The mechanical assembly is chiefly a gear-driven, clutch-connected camshaft, acting through connecting and locating members to secure the work in a vise. The pneumatic components are small air cylinders which perform operations in the cycle. The feeder handles round, rectangular or odd shapes, and can be detached from the miller. *Production Tool & Die Co.*, Springfield, Mass.

Speed Indexer

AN automatic holding and indexing fixture has been developed for milling operations which indexes automatically by connecting the fixture with the table control. By incorporating a standard Erickson precision collet and a special precision collet chuck, the part held is located from the outside diameter. Other indexing divisions can be ob-

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Special Axle:
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With All the Features You Need . . . or Ever Will Need!

- Pendant Boom Suspension . . . boom length can be altered without re-reeving boom hoist cable.
- Throttle Lever is within easy reach of operator . . . positive power and speed control at all times.
- Heavier, air-cooled Double Disc Clutches . . . for smooth performance and easy operation.
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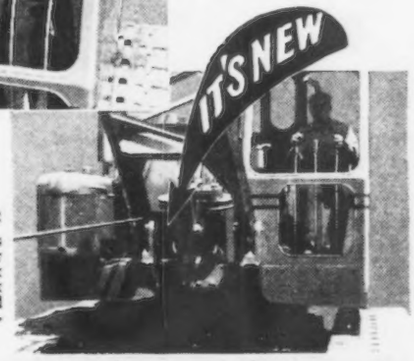
- New leak-proof Oil Seals . . . keeps lubricants in . . . and dirt and abrasives out.
- New style foot brakes with self-aligning bearings on brake operating shafts. Wider, self-equalizing brake bands which eliminate dragging or scoring.

Swing Lock Control:
Hand operated swing lock control within easy reach of operator . . . no more stooping, kicking, or leaving cab for this operation.



New Type Magnet Fairlead:
This elevated Fairlead is especially adapted for magnet operation. It equalizes cable contact on two sheaves instead of one, minimizes unnecessary wear.

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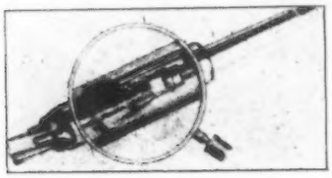
tained by using different index plates. Concentric holding and perfect alignment is assured, milling operations being rigidly parallel to the center axis of the work. *Erickson Tools Div.*, 2309 Hamilton Ave., Cleveland 14.

Taper Drive

A TAPER drive, detachable by hand, shake-proof, rigid and accurate, is designed for use with tungsten carbide and high speed



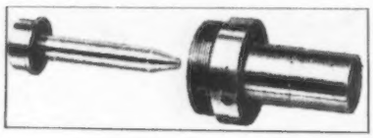
steel end cutting tools for single purpose mass production operations. *Eclipse Counterbore Co.*, Detroit.

Drill Jig

THE Model 750 drill jig was designed for shops having cross-drilling operations on a variety of work stock diameters in a variety of hole sizes on such parts as pins, small shafts, tubing, screws and screw machine parts. Cam action is employed to actuate an anvil up and down, to and from locking position. It has an adjustable side stop for accurate positioning of the hole and wearing parts are made of heat-treated machine or tool steel. The jig is furnished with two bushing plates, two double-end anvils, and a lock-release rod. Bushing plates accommodate standard slip bushings to 11/32-in. hole size. *Manufacturer's Engineering Service*, Security Bldg., Toledo 4, Ohio.

Expanding Arbor

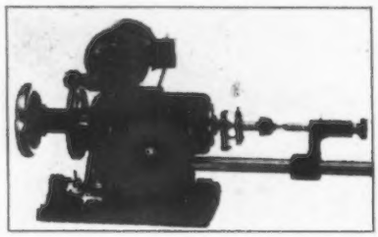
A NEW expanding arbor for internal gripping adds to the utility of 1, 1½ and 2-in. Levermatic collet chucks. The split arbor



is mounted in the chuck in place of the collet and collet nose and expanded by the lever. A complete range of expanding arbors is available for work from 5/16 to 4⅝ in. diam. *Porst Bros. Mfg. Co.*, 259 No. California Ave., Chicago 12.

Radial Relief Fixture

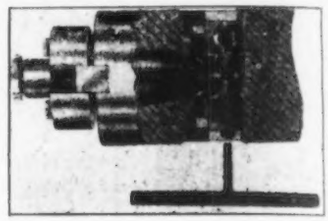
A FIXTURE for producing radial-relieved cutting tools, reduces machine running time, cuts setup time, and reduces maintenance cost. These advantages derive from the fact that radial-relief grinding removes a minimum of stock behind the cutting edge, allowing clearance that is adequate but no more than required. Also, by regulating the amount of relief, tools can be repeatedly sharpened while still adhering to their original specified tolerances. No special cams are needed to regular spiral or radial-relief. Indexing of the number of flutes, from 1 to 6, is controlled by a simple gear change, and because of the geared indexing, all teeth cut are in a true circle. The work center line remains parallel to the axis of the grinder, allowing true dressed forms to be reproduced radially and spirally without trial-



and-error or compensation. By reversing the actuating cam, left hand work can be handled. Work up to 1-in. diam can be accommodated in a draw-bar collet, and work up to 4½-in. diam x 12-in. long can be handled between centers. There are no limitations on the types or shapes of end-cutting contours that can be produced. *Glenbard Tool Manufacturers, Inc.*, 216 N. Clinton St., Chicago.

Quick Change Spindle

A POSITIVE means of seating and ejecting shank type cutters, arbors and adaptors without resorting to draw keys and drifts is available with a new horizontal boring-machine spindle. The spindle is provided with a steep or fast taper socket and a simple built-in double-acting screw locking device. Cutting tools are mounted by inserting the shank of the cutter, arbor, adaptor or boring bar into the spindle opening or socket. The latter has a National Standard taper correct in size to meet spindle diameter requirements. The double acting screw lock, composed of two segments and a screw, is located in a special draw slot in the spindle behind the taper opening. Seating or drawing in the shank is accomplished by tightening the lock's single screw, which has right and left hand threads. By drawing the two lock parts together, a wedging action is caused between the lock segments and against tapered notches



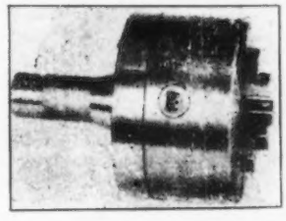
cut in the adaptor shank. To eject the cutting tool assembly, the lock screw is turned in the opposite direction. A second taper on the lock segment wedges against the mating taper on the end of the arbor, and by applying pressure with a hand wrench, the friction between the contacting surfaces is broken. *Giddings & Lewis Machine Tool Co.*, Fond du Lac, Wis.

Small Portable Drill

HAVING ¼-in. capacity, a lightweight portable drill, the No. 24, is suitable for drilling metal, wood and composition materials. Only 8½ in. overall, and weighing 3¼ lb, its compact design permits working in close quarters. Features of the drill include an aluminum die-cast housing, trigger-type switch with locking device, and a three-jaw Jacobs chuck. The drill can be converted into a bench drill press by locking it in a No. 514 stand. *Stanley Electric Tools*, New Britain, Conn.

Chuck

A NEW chuck for the fixture of the D-S radial relief grinder has a capacity of ⅛ to 5 in., and is



mounted on a face place equipped with a ground arbor that fits the fixture spindle. Adjustment can be

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Economy forbids constant valve-twisting...

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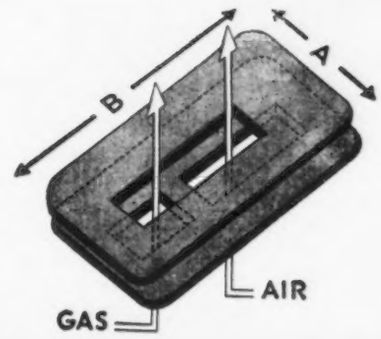
You *lock* the fuel-air mixture where you want it. Then neither changing demand, nor random gas and air pressures, nor adjustment of furnace or burners, can keep the KEMP Slide-valve from the accurate completion of its appointed duty. Twenty years hence it's producing at the vernier setting on which you fixed it!



SEE HOW SIMPLE IT IS... Upper slide with one port overlaps Gas and Air ports in lower slide. Fuel demand automatically moves upper slide in direction A-A to increase or decrease gas and air in precisely equal proportions. Manual adjustment by micrometer screw control and vernier scale in direction B-B adjusts proportion of gas and air. You lock it and there it stays until you change it. Simple! Adjustable! Fixable! A self-cleaner, too, and like the rest of the KEMP Industrial Carburetors it requires virtually no maintenance.

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We use gas-air combustion for_____

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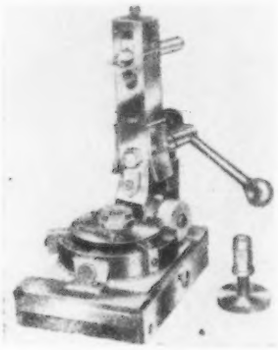
made between the chuck face plate to assure positive concentricity of the chuck. The chuck can be used in place of collets where one or two tools of a size are radially relieved at a time, and a time savings in collet interchange is accomplished. *D-S Grinder Div., Royal Oak Tool & Machine Co.*, Royal Oak, Mich.

Wheel Dresser

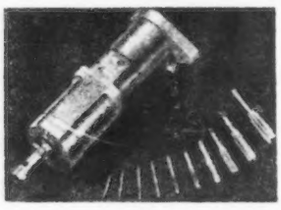
A RADIUS and angle wheel dresser, Model A, can form concave or convex radii with any two angles



tangent in one continuous motion without stopping. The new 180° attachment for full concave dressing insures complete coverage of wheel forming with the dresser. *Matco Tool Co.*, 2830 W. Lake St., Chicago 12.

Tapping Head

THIS new tapping head, it is claimed, will replace three conventional tappers because it will handle taps from No. 0 to ¾ in., and is designed to fit any drill press. A patented spring clutch drive and an adjustable torque control are employed, giving the tapper extreme sensitivity. It is suited for



cycle tapping and OD threading, as well as routine machine tapping. Blind hole tapping is also possible. The spring clutch drive eliminates slipping and wear caused by misadjustment and misuse. The adjustable torque control, preset for the tap size, permits the tap to move into and out of the work with automatic sensitivity. *Commander Mfg. Co.*, 4225 W. Kinzie St., Dept. IA, Chicago.

Contour Wheel Dresser

THE contour wheel dresser is a high precision abrasive wheel dresser, which operates on a 10 to

1 ratio from a template which controls the movements of the diamonds through a stylus. It dresses not only radii and angles but continuous contours across the wheel. Any great degree of skill is not required to operate this dresser once the template is made. All errors in the template are reduced in a ratio of 1 to 10 through new application of hydraulic principles. The limitation of the contour to size or shape is the size of the diamond. If the contour can be entered with a diamond, it can be dressed. With the 0.002 in. radius diamond, concave radii 0.002 in. or larger can be generated. The dresser is not attached to the machine. It has a 10-in. diam, 1⅛-in. wide wheel capacity. *Hoglund Engineering Co. Inc.*, 697 Selfmaster Parkway, Union, N. J.

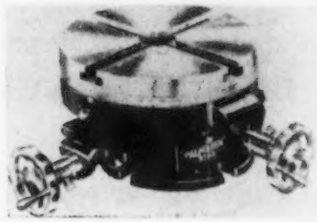
Flexible Shaft Machine

A FLEXIBLE shaft machine has been designed to drive midget mills, rotary files, burrs, drills and

other carbon and high-speed steel cutting tools at the right cutting speed, and maintain the proper rpm under both load and no load conditions. Positive speed control gives reduced speeds while maintaining maximum motor torque, any required rpm being set at the fingertip speed control lever. Speed range is from 1000 to 10,000 rpm. Two rotary handpieces are available: A ball bearing handpiece equipped with a No. 0 Jacobs chuck, and a sleeve bearing small diameter handpiece. *Electro-Mechano Co.*, 261 E. Erie St., Milwaukee.

Indexing Table

A NEW No. 82 indexing and cross slide table, with a graduated rotary top, can be rotated a full 360° manually or locked in any desired position. The table is 8-in. diam, and T slots provide for convenient mounting of parts and fixtures. Cross travel is accomplished by feed screws calibrated in thou-



sandths. Adjustable gibs take up wear. A maximum travel of 4 in. plus the 360° rotation of the table top makes the tool adaptable for many milling, drilling, shaping or surface grinding operations. *Chicago Tool & Engineering Co.*, 8383 So. Chicago Ave., Chicago 17.

Work-Holder

A SAFETY work holder clamps to the column of any small standard drill press and secures the work with only a quarter-turn of a single lever. It is claimed in many cases the tool can substitute for simple drill jigs. The clamps are designed for adjustment along the length of the cross arm to encompass the width of the drill press table and are swung back to clear a drill jig or machine vise when necessary.

Standard sizes fit drill presses with columns of 1⅝, 2¼, 2¾, 3½, 3¾ or 4-in. diam. *Universal Vise & Tool Co.*, Parma, Mich.

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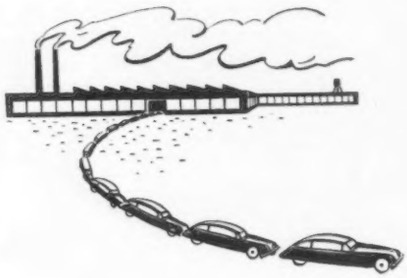
Assembly Line . . .

WALTER G. PATTON

• Stocks of cars in showrooms are increasing but gain is temporary... Packard hits new postwar production peak... Record output for industry seen.



DETROIT — While repercussions from the recent increase in the price of semi-finished steel are still being heard, in Detroit Crosley Motors, Inc. has announced a price reduction in its lightweight cars. Factory list price of the Crosley sedan has been reduced from $888 to $869. A reduction of $50 in the price of the Crosley convertible was announced recently.

In announcing these new prices, Crosley pointed out that the lower prices were made possible by increased production, revamping of body dies, better tooling and other improvements, including new painting equipment. Another factor contributing to the price decrease, he said, has been the general tightening of quality control in every step of production.

The auto industry has not indicated, generally speaking, that its production costs have been reduced for many operations. With a few exceptions, the industry is saying that production schedules have, on the whole, been disappointing; therefore, unit costs have not been as favorable as expected. The industry also contends that the cost of new tooling has been two or three times the prewar figure. This is because of higher wage rates paid to toolmakers and the more complex tooling required for mass production. Economies in painting have been indicated although in some cases these savings have been partially offset by increased investment in equipment.

* * *

The automobile industry has undoubtedly been able to achieve some important economies through improved process and quality control. In a paper given before the SAE National Passenger Car and Production meeting in Detroit, R. H. McCarroll, director of chemical engineering and chemical and metallurgical research for Ford Motor Co., pointed out that it had previously been necessary to reject 12 pct of Ford speedometer gear shafts because the square hole was not concentric with the bearing diam. At the present time, he said, Ford is rejecting less than 1 pct of the stock and this operation has been brought under production control.

As another example, McCarroll pointed out to the assembled engineers that Ford was having trouble with the outside diam of a push rod. Before adopting quality control methods, he said. Ford was checking production 100 pct, using 10 inspectors per shift for three full shifts. By applying statistical control methods, Ford was able to reduce the amount of checking to a percentage basis, using one man per shift and maintaining a quality level of 0.5 pct defective.

McCarroll cited a number of other advantages to the Ford organization resulting from the use of production process control methods. Included in the list are: (1) better training of supervisory personnel, (2) improvements suggested by process control engineers, (3) better education of manufacturing operators, (4) elimination of unnecessary operations, (5) better uniformity of quality, (6) less re-runs and repairs, (7) lower scrap.

* * *

THE automobile industry is giving a lot of consideration to forged parts which are so designed and produced as to reduce to a minimum scrap loss in the form of crop ends, flash trimmings and machining chips.

In another paper given before the SAE in Detroit, J. H. Friedman, vice president and general manager, National Machinery Co., described some of the steps which have been taken to reduce forging costs by decreasing the amount of flash and machining scrap.

During the war, Friedman told his audience, Timken Detroit Axle Co. was using conventional machining methods to produce automotive differential pinions. When the parts were machined from bar stock, 4.77 lb of steel was required. In the finished form, these pinions weighed 1.34 lb, representing a loss of 3.43 lb. Another pinion required a stock weighing 1.65 lb. By a combination of forging and partially finishing the pinions on presses a substantial saving in steel was effected, he told his listeners. To be specific, after redesigning, the stock required for the larger pinion was reduced from 4.77 lb to 2.12 lb; and the forging stock for the smaller size weighed .92 lb, as compared with 1.65 lb for the cut pinion.

The speaker pointed out that the teeth in these pinions are cold coined to final dimension and finish and the pinions were forged so accurrately that only three machining operations were required to complete the job. These operations were boring the hole for the differential trunnion, chamfering the hole, and finishing the back face.

Phillip O. Johnson and *Russell G. Heyl, Jr.* in their paper, "Stress Engineering as Applied to Automotive Bodies," describe the test methods currently being used by Fisher Body.

In one test the body-frame assembly is placed on a rig where it is slowly twisted, alternately clockwise and counter-clockwise. This test permits visual observation of how the structure acts. On the basis of this test, it is pointed out, local weakness can be corrected either by strengthening the parts or making other parts less rigid.

This test is then repeated with the rig set up to slowly bend the body as a beam rather than applying a torsional twist. Undesirable body characteristics showing up as the result of this test can usually be taken care of by redesign, after

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"There is no better-paying investment than the right tools for the job"

which the body is ready for further tests.

THE next test, the authors pointed out, is to subject the assembly, body and frame, to a beaming load to determine its rigidity. Following this test, a torsional rigidity test is made in which the torsional rate (ft lb per degree) is determined.

Another test is the bumper jacking test in which the car is jacked at the front bumper and the door opening deflections are measured. The same test is performed for jacking at the rear bumper. If the door opening deflections are excessive, door closing and opening troubles will be encountered when the customer jacks up the car, according to Fisher engineers.

Other body detail tests include a deck lid theft test, door hold open fatigue test, seat comfort and structural test, lock breakdown test and fatigue test to determine if a design will have a satisfactory life under service conditions. Following tests in the laboratory, the body is subjected to road testing.

Your personal observation that auto dealers seem to have more cars in their showrooms these days is probably correct. Recent disclosure by Kaiser-Frazer that its dealers have on an average five cars (about a month's production at the present rate) is undoubtedly tops for the industry.

Auto executives insist, however, that with the big spring selling season coming along any increase in auto dealers' stocks during the past few months will probably be wiped out very quickly. "The buyers market in new cars is still far off," they insist, although some observers who have watched the skidding price of new cars on used car lots are not so sure. This price decline applies particularly to top luxury cars in the $3000 to $5000 class.

* * *

Packard had its largest weekly production in the postwar period when weekly assemblies totaled 2087 cars. The largest previous output was 1455. During February 3835 cars were shipped despite the loss of 11 working days due to the industrial gas shortage. Packard explains its new production affluence on the basis of "an improved supply situation."

Washington . . .

EUGENE J. HARDY

• Steel price investigations packed with forecasts of events to come . . . Fairless, Homer and Batcheller explain price increase on semifinished steel.

WASHINGTON — Recent price increases in semifinished steel and other products will undoubtedly plague the steel industry for many months to come. This was made clear at the hearings before the Joint House-Senate Economic Committee, headed by Senator Taft, R., Ohio, at which B. F. Fairless, president, U. S. Steel Corp.; A. B. Homer, president, Bethlehem Steel Co., and H. G. Batcheller, president, Allegheny Ludlum Steel Corp., were thoroughly grilled by both Democrats and Republicans.

Briefly the effect of the hearings can be summarized as follows: (1) Continued attacks from those in the government who feel that price leadership as an adjunct to monopoly can be anticipated; (2) Increased antitrust appropriations for Justice and Federal Trade Commission; (3) A strong possibility that Congress will approve an FTC request for funds to carry out the steel industry study requested by the Senate Small Business Committee (THE IRON AGE, Jan. 15, 1948, p. 98); (a) Proponents of nationalization of the industry, as well as those who advocate production and price controls, have also been given considerable new ammunition.

Some committee members feel that last week's hearings have effectively forestalled further price increases in steel and other industries. Congress can also be expected to pay increased attention to economic matters. This is evidenced by the fact that all committee members, numbering more than a dozen, took back to their offices the mass of data presented by the steel industry.

WHILE the committee may have been convinced that the price increases were justified on a simple profit-loss basis, and were grossly exaggerated in the public mind, nevertheless the committee feels that the action was definitely inflationary in effect, that it will accelerate demands for wage increases and that it was badly timed.

Whether caused by unpreparedness or from other causes, U. S. Steel apparently failed to make a strong case for itself under questioning of the committee which centered its fire on the corporation, holding it to be the bellwether for the industry in general. The committee obviously was less impressed by efforts of Mr. Fairless than by those of Mr. Homer who shot back figures without hesitation and used Presidential statements on the need for reasonable profits with telling effect.

A brief summary of portions of the testimony of the steel industry representatives follows:

B. F. Fairless—U. S. Steel does not now contemplate a general price increase. There was no good reason why U. S. Steel should grant a subsidy of $5 a ton to semifinished steel customers. Semifinished steel losses were running $1 million a month. Even after the price increase, one of our semifinished products is selling at a loss (skelp). Buyers of semifinished do not have to pass on increases. Change to a net ton basis merely followed a trend in the steel industry. During the period 1940-47, U. S. Steel prices advanced 46 pct, including extras. Profits are "fairly satisfactory" on only 75 pct of our production. Don't believe it is necessary to have a third round of wage increases. Working capital has declined. We are charging far less for our steel than we could get in today's market. Productivity is down, but is improving.

A. B. Homer—increases in semifinished products, affecting less than pct of rolled product sales, were made on Feb. 18 to meet the market and recoup losses. We are still losing money on these products. Selling some products "substantially" under competitor's prices, plates $10 to $36 less. Forced to rely heavily on earnings to finance expansion program. Prices 48 pct higher now than in 1939. Increases in structural shapes coming. Losing $1.50 to $2 a ton on structurals. We see no further justification for further wage increases.

H. G. Batcheller—our recent price increases affect about 1 pct of a month's sales. Such increases were long overdue, due to steadily increasing costs. No major change in the price of stainless had been made in about 2 years. Feb. 19 increase on carbon steel strip directly attributable to the increase in price of carbon steel billets.

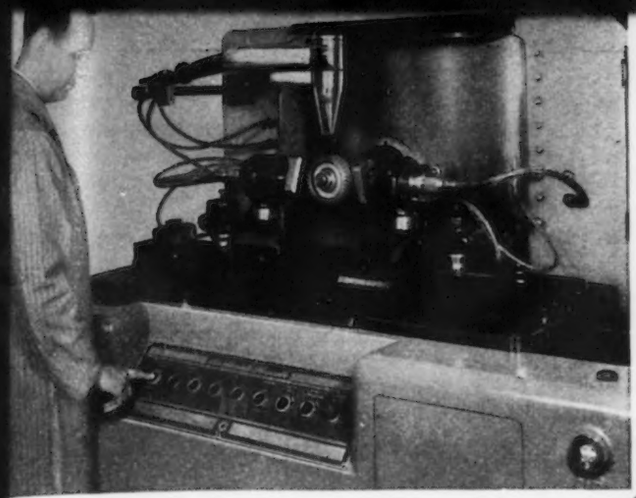
* * *

Washington

• • • Proponents of tougher antitrust laws believe that steel price rises have created new interest in legislative proposals to tighten up the Sherman, Clayton, and FTC Acts.

The Senate Judiciary Committee has reopened hearings on a perennial proposal of the Federal Trade Commission to block acquisition by corporations of the assets of competitors.

Senator Langer, R., N.D., declared in a subcommittee hearing



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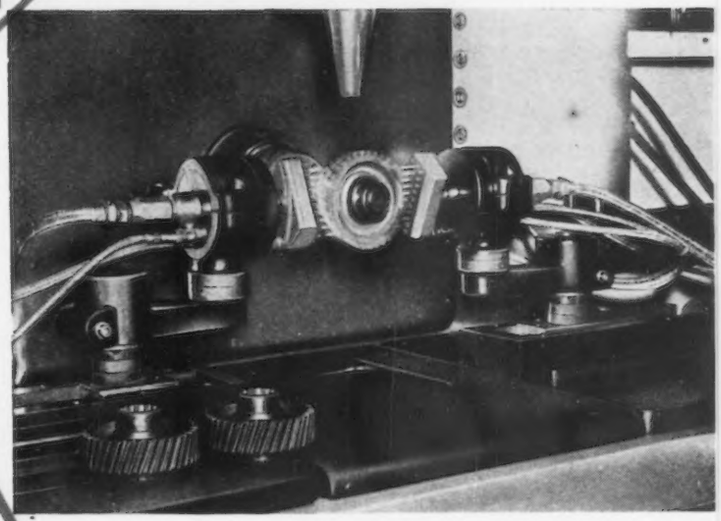

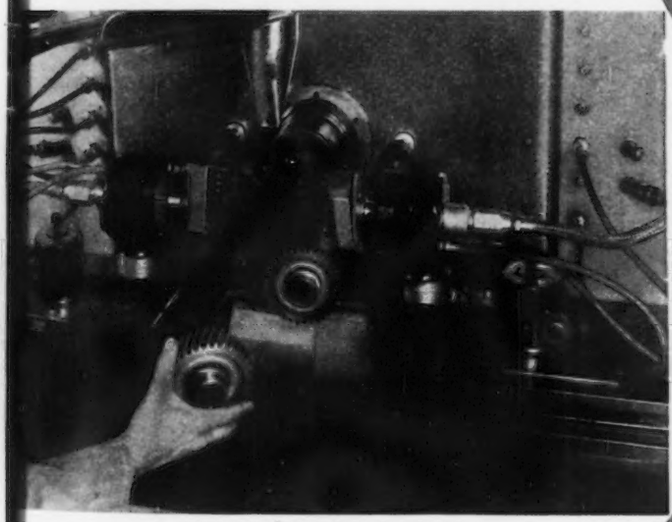

part is deposited into quench automatically

Faster than can be done manually, a relay causes the work-holding fixture to retract, "stripping" the work off and depositing it into the thermostatically controlled quench and onto an endless conveyor in the tank.

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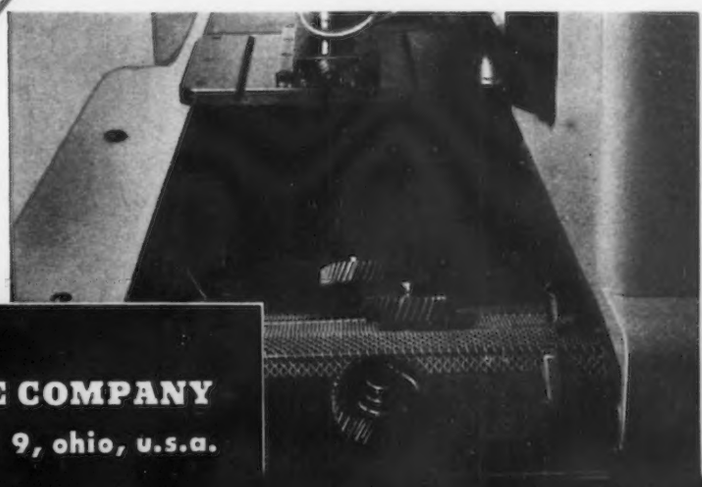

HE CINCINNATI MILLING MACHINE COMPANY

CINCINNATI

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last week that he would "do everything possible" to get a favorable committee report on the bill (S. 14) introduced by Senator O'Mahoney, D., Wyo., and backed by FTC and the Justice Dept.

John M. Blair, FTC economist, sharply criticized what he termed the "monopolistic tendencies" of U. S. Steel Corp., Bethlehem Steel Co., and Republic Steel Corp. Passage of the O'Mahoney bill, he said, would be a "major solution" toward blocking these "tendencies."

Questioned by Senator Ferguson, R., Mich., as to results of the FBI's probe of the price rises, Assistant Attorney General John F. Sonnett said he had "no evidence yet" that the price rises were connected with anticipated wage hikes. Asked if he had uncovered evidence of monopoly, he said he "felt it unwise" to disclose such information until completion of the FBI investigation.

Lynn Paulson, FTC attorney, told the committee the steel industry was "in a fine position" as a result of FTC's findings to date in price-fixing charges brought against the industry.

"You mean on the spot?" Senator O'Mahoney asked.

"I mean on the spot," Paulson declared.

Navy Salvage Campaign May Help Scrap Supply

Washington

• • • **Steel experts** hold little hope of getting much scrap from the Navy's latest salvage campaign, but the feeling is that "it all helps".

The new Navy order requires commands to report monthly on all stocks of ferrous equipment with a view to immediate scrapping of obsolete material.

The reports are to note (1) property already deteriorated beyond economical repair, (2) property expected to be beyond economical repair before date of expected use, and (3) property held as reserve and expected to be beyond repair within 12 months.

The monthly reports are to include tonnages of ferrous materials reported and tonnages finally released for disposition. The Navy has disposed of about 1.4 million long tons of ferrous scrap in the last 18 months.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

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NOW IT CAN BE TOLD — *More* and *better* threads are being produced per dollar of tool cost on practically every job where Sheffield Taps are used.

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Automatic Carbon Arc Welding Simplifies Production of Rotors

By R. B. Keith, Mgr.
American Electrical Products Co.
Mansfield, Ohio

MANUFACTURING our small electric motors requires welding the ends of the copper bars in the rotor lamination assemblies after a previous mechanical upset of the bars during sub-assembly. The weld is required to produce a solid integral unit electrically, one that will eliminate the possibility of the laminations working loose under operating conditions. This process of welding or fusing copper or aluminum assemblies is typical of present day methods to obtain the highest degree of product quality and ruggedness.

Developing a semi-automatic welding procedure has not only reduced our costs considerably but has enabled the operator to obtain highly uniform results on a mass production basis. Our procedure has also simplified the operation problem into one of merely loading and unloading the rotor assembly to and from a fixture.

An indexing type of rotary table fixture (Fig. 2) incorporates three stations, one for loading, one for the work position in which the piece is rotated under the welding electrode, and one for unloading after welding. Hand operated positioning pins locate the table in alignment with the welding carbon electrode as each station comes into the welding position.

Carbon arc welding is performed with a Lincoln TA-3 "Electronic Tornado" automatic welder (Fig. 1), melting the upset ends of the copper bars and fusing the ends of the bars into a continuous ring. In the operating or welding station, the work-holding plug is set to rotate at a predetermined speed, allowing the periphery of the rotor face to travel under the carbon arc at the correct welding speed. A tilting adjustment on the table permits variation of the bead shape. A 2.32" diameter rotor is fused in a 15-second cycle, using 100 ampere current on the welder.

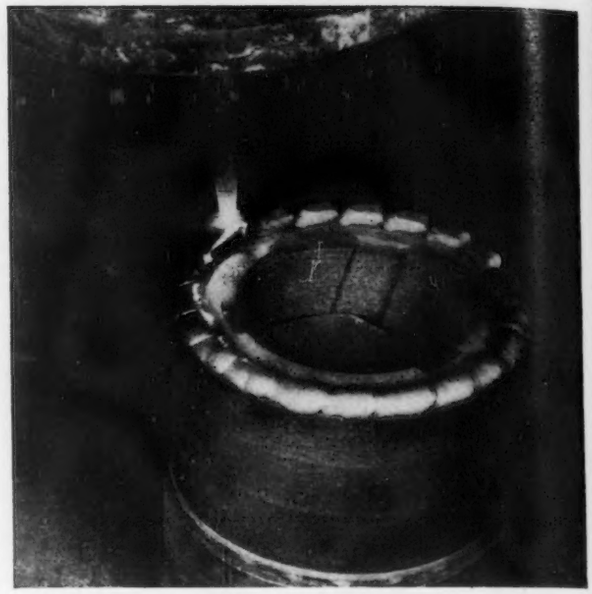


Fig. 1. Arc welding copper bars into a continuous ring. Cycle time—15 seconds.

Under production conditions, the table is fitted with a hood guard (Fig. 3) to shield the operator from the arc. The welding cycle is such that it allows the work to be removed from the furnace, where it is preheated to 700° F., and the work loaded onto the indexing table before rotating the table to the arc station position. The indexing of the table actuates cams that start the welding cycle, eliminating any need for the operator to push a starting button on each cycle. A machining cut is taken after the piece cools to square the face of the weld.

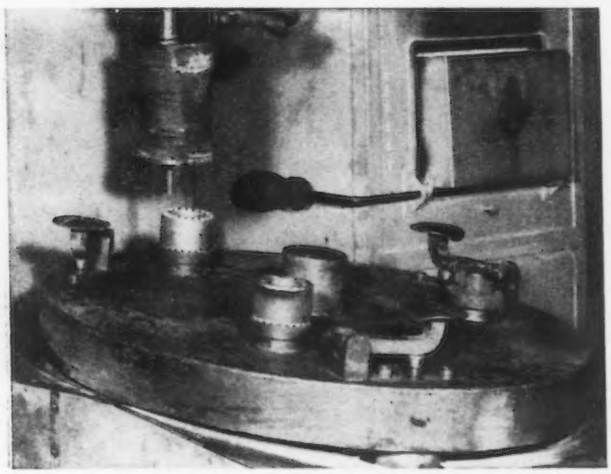


Fig. 2. "Electronic Tornado" Welder mounted on a rotary indexing table-type fixture—hood removed.

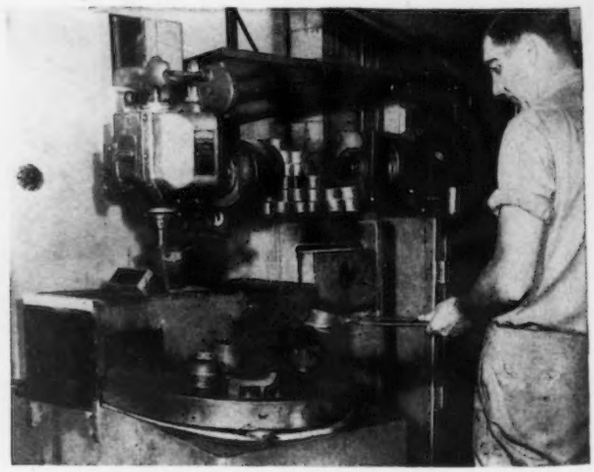
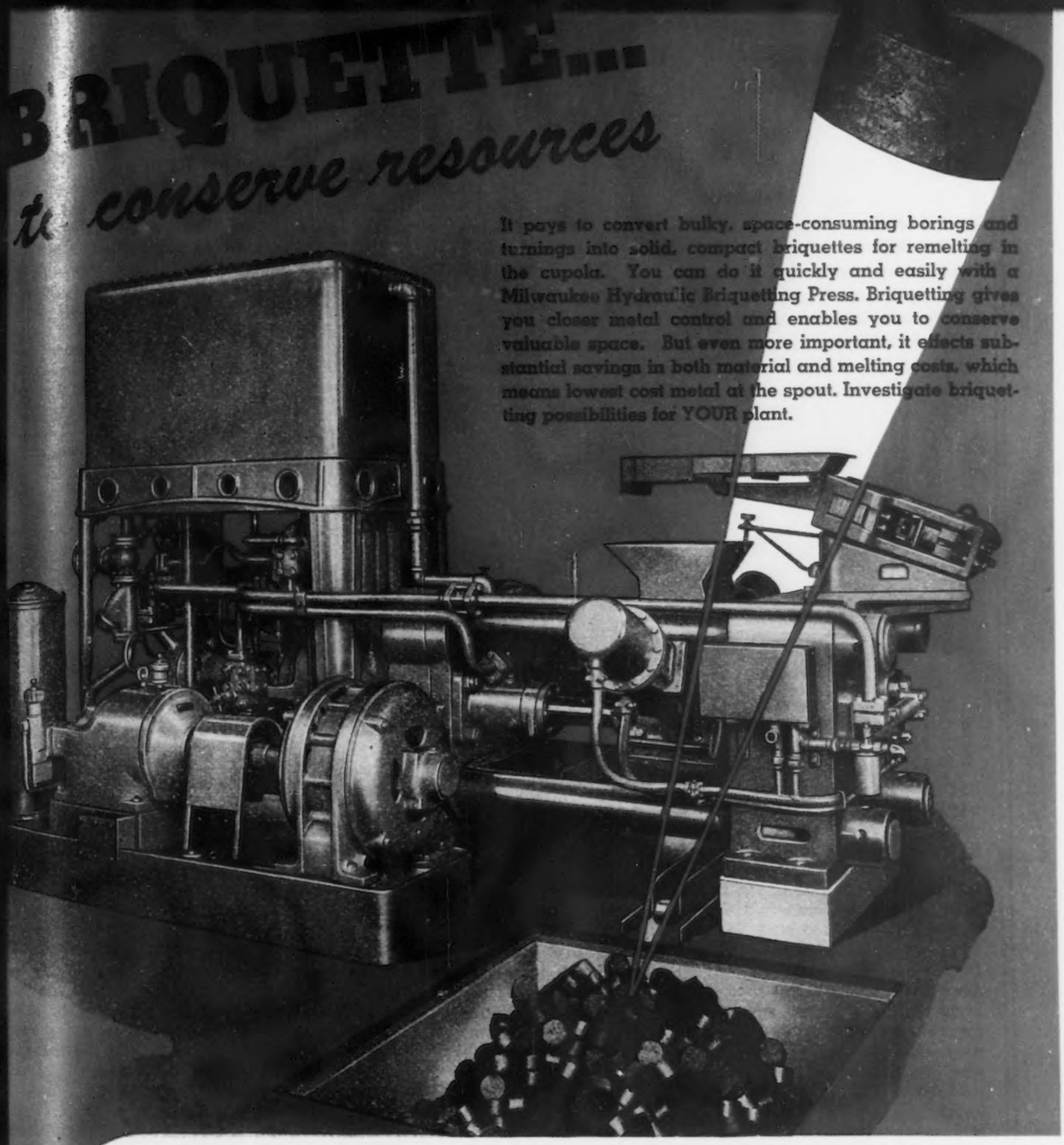


Fig. 3. Loading preheated rotor assembly on indexing table.

BRIQUETTE... to conserve resources



It pays to convert bulky, space-consuming borings and turnings into solid, compact briquettes for remelting in the cupola. You can do it quickly and easily with a Milwaukee Hydraulic Briquetting Press. Briquetting gives you closer metal control and enables you to conserve valuable space. But even more important, it effects substantial savings in both material and melting costs, which means lowest cost metal at the spout. Investigate briquetting possibilities for YOUR plant.

The Machine Pays for Itself! Briquettes produced with a Milwaukee Hydraulic Briquetting Press act like solid blocks of metal of identical size and weight. They melt readily, with practically no loss whatsoever. Aside from serving as a conservation measure, the briquetting process pays for itself in the greater amount of scrap metal salvaged from borings and turnings in the plant. Also of importance is the space and labor saving factor . . . the tremendous bulk of borings and turnings is reduced by briquetting to a uniform and convenient size for handling readily and without breakage.

Check Your Tonnage! Why not check your annual tonnage of metal borings and turnings to determine the possibility of salvaging it economically. Milwaukee engineers will gladly make available to you, for the asking, a vast store of knowledge and experience in solving your chip reclamation problems. Write today for Bulletin 117 giving complete details.

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West Coast . . .

ROBERT T. REINHARDT

• Pig iron shortage remains serious for foundries . . . Scrap situation is looking easier . . . Baling presses make appearance, but buyers critical.

LOS ANGELES—Either legerdemain will produce 80 pct more merchant pig iron than has been coming into this area, or about 1600 metalworking industries are soon to feel the pinch and start a howl that will be heard from coast to coast.

That is the opinion of the Industrial Dept. of the local Chamber of Commerce. As reported in THE IRON AGE of Mar. 4, 1948, gray iron foundries are struggling along under shortages of pig iron and operating well below capacity. The consequent shortage of castings will soon begin to affect other metalworking industries in the area, according to R. D. Sangster of the local chamber, with a consequent serious threat to employment in that field.

Historically the West Coast required 150,000 tons of merchant pig iron per year. Recently shipments haven't begun to meet demand. Before the war Columbia Steel Co. shipped about 50,000 tons of merchant pig iron into the coast market. But since the end of hostilities and in the face of scrap shortages, this company has been capable of releasing only a fraction of that amount.

Best estimates available, developed as a result of a careful survey, show that Los Angeles foundries are getting not more than 20 pct of normal requirements which are placed at 75,000 tons per year.

There are about 70 gray iron cupolas in this area including both jobbing foundries and those connected directly with manufacturing operations which would like to get about 6250 tons of merchant pig per month. A survey reported that instead of this amount these foundries actually got: January 1948, 3000 tons; February 2500 tons; and estimated for March 300 to 700 tons.

AS a result of this shortage heavy charges of scrap are being used and melts are below standard with rejects running high. Good scrap is at a premium. Those foundrymen who had hoped to find some relief from shipbreaking operations are being disappointed, as the steel producers breaking their own ships are holding on to the iron castings they get and putting them into their openhearths.

"The spirit is willing, but the flesh is weak" so far as Columbia Steel Co. and Kaiser Co., Inc. are concerned in solving this admittedly serious problem. Columbia's 600 ton-per-day blast furnace at Ironton, Utah, is giving its all, which is far from adequate to meet the needs of the openhearths at Torrance and Pittsburg, Calif., let alone leave much over for the production of merchant pig.

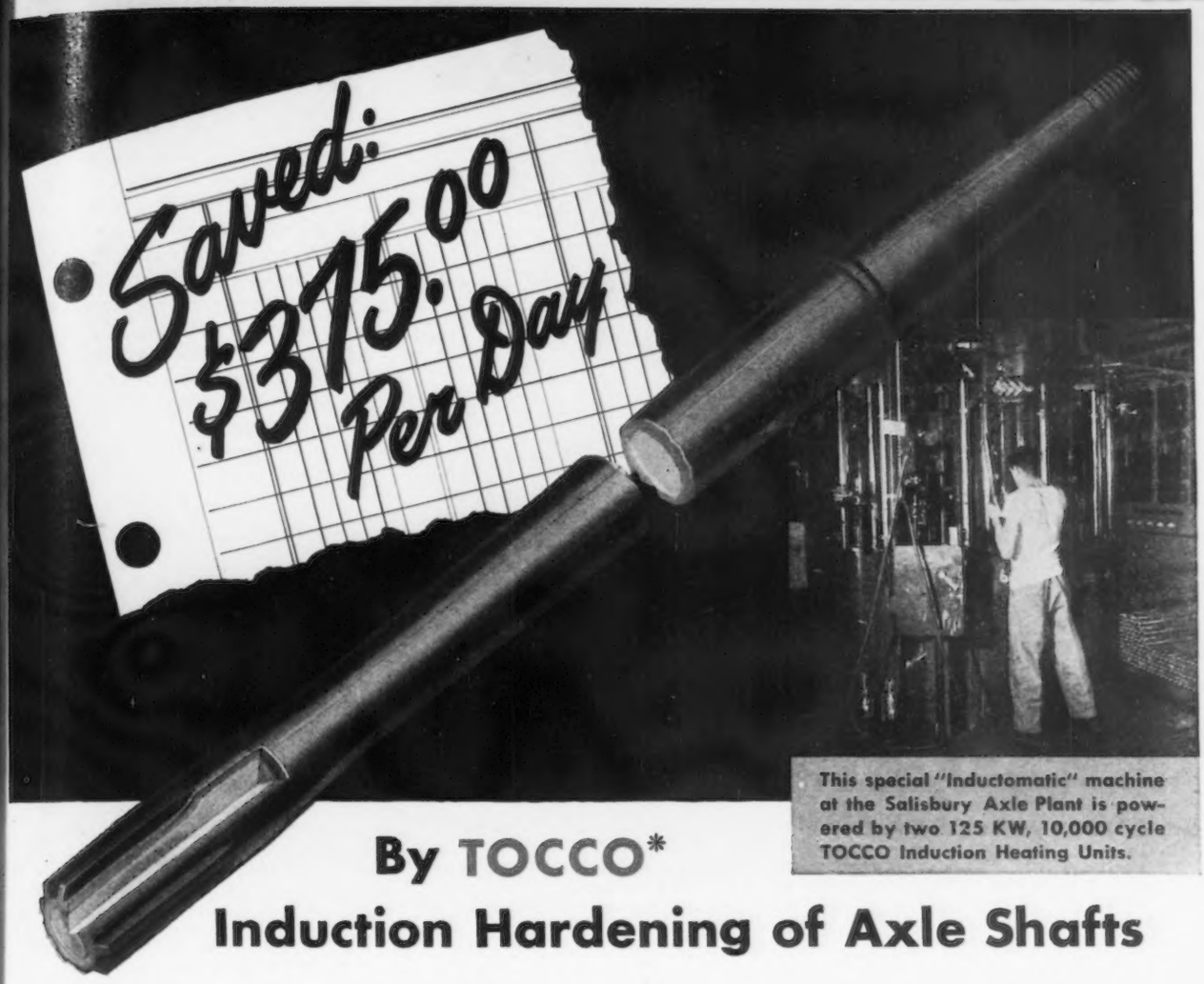
Much of the same situation holds true in regard to the three blast furnaces of Geneva Steel Co. at Geneva, Utah. With ingot production at a high point at Geneva and with almost complete dependence on pig iron and home scrap for openhearth charges, there is little chance of Geneva putting any of its blast furnaces on merchant pig. On the contrary, there is every reason to believe that Geneva will be more interested in building up a good pig reserve to insure 100 pct operation of its openhearts so as to be in a healthy position to start rolling sheet when conversion of facilities is accomplished at the end of this year.

Kaiser Co., Inc. at Fontana, Calif., while eager to maintain local support of its operations, can hardly do otherwise than continue to build up a stock reserve of pig in the face of the tight scrap situation and the hovering phantom of a close down on the 1200-ton blast furnace there. This stack has been under heavy blast for about 5 years. Although it still appears in good shape, management knows that sooner or later it is going down for repairs. Consequently, efforts are being made to build up a good stock of pig iron for the openhearths and with the scrap market what it is today, a "good" stock is an extremely relative term.

ONE favorable sign in the entire situation is a moderate betterment in the scrap picture. From one end of the coast to the other, reports show that a bit more scrap is becoming available. Most of this has been developed the hard way—through shipbreaking. The most touted government efforts to produce scrap aren't taken too seriously except as they produce ships for breaking.

At this time there are about 10 major shipbreaking operations on the coast which have enough obsolete vessels to work on to make substantial contributions to western openhearths. It is true that at least one of these shipbreakers is playing for high eastern scrap prices, but is not getting very far in its efforts to increase local prices. This operator has been told by at least two large buyers that it is a waste of time to offer his ship scrap at eastern prices less freight. Consequently some scrap developed in shipbreaking out here is going east even though it is believed there is some financial loss involved in maintaining an attitude.

Apparently there is little scrap-dealer resentment developed as the result of Kaiser Co., Inc. and Columbia entering the shipbreaking business. Kaiser is working hard at Yard 3 in Richmond, Calif., producing about 15,000 tons per month of its needed 25,000 tons of scrap. Columbia is interested in Walter Johnson's operations at Stockton, Calif. In the Pacific Northwest a similar situation exists with Kaiser interested in Consolidated Shipbuilders and Oregon Steel Rolling Mills working closely with a wrecker. Only Bethlehem Pacific Coast Steel Corp. is without a shipbreaking partner, but it obviously is ben-



This special "Inductomatic" machine at the Salisbury Axle Plant is powered by two 125 KW, 10,000 cycle TOCCO Induction Heating Units.

By TOCCO* Induction Hardening of Axle Shafts

WHAT progressive engineers at the Salisbury Axle Division of Dana Corporation have done with Induction Heating for hardening automotive axle shafts suggests comparable savings for your products. Note this report:

SAVINGS of $375.00 per day caused by increased output and switch from SAE 4140 to SAE 1033 steel made possible by induction hardening.

LESS MACHINING time because shaft of SAE 1033 steel is completely machined prior to hardening. Tool cost cut in half—turning time reduced from 2 minutes to 30 seconds.

PRODUCTION DOUBLED. Formerly 50 axle shafts per hour with conventional combustion type heating—now 120 per hour with TOCCO.

PRODUCT IMPROVED. Torsional fatigue has increased 200%. The shaft is no longer a compromise between durability and machinability. It is hardened to 55 RC and drawn back to 43-47 RC. Degree of hardness and depth is accurately controlled.

TOCCO Engineers will gladly survey *your* operations for similar cost-cutting results in hardening, heat-treating or brazing—without obligation.

THE OHIO CRANKSHAFT COMPANY

TOCCO

*Trade Mark Reg. U. S. Pat. Off.

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FREE BULLETIN

THE OHIO CRANKSHAFT CO.
Dept A-2, Cleveland 1, Ohio

Please send copy of "TOCCO Hardening"

Name_____

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Company_____

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City_____ Zone___ State____

efitting by the development of other prime steel producers.

One of the important scrap buyers on the coast has paid high tribute to established scrap dealers by stating that on the whole they have recorded their best production records of all time during the trying and scarce year of 1947. There is nothing altruistic about this activity, of course, but apparently there is ample evidence of a sincere desire on the part of the scrap dealers to keep the producing industry going in tough times against the day when sole reliance will be placed on local collections to keep openhearths full.

A CONSIDERABLE number of baling presses are making their appearance in this area which indicates that the scrap men are looking ahead to the day when more auto bodies and similar junked machines become available for market. At present the buyers of such baled material are critical of the lack of care exercised by some dealers in preparing it for market. There has been too much baked enamel stock getting by and there are also too many inclusions of rock and dirt to be excused as carelessness on the part of new help. Buyers are getting tougher and as scrap inventories build up—as they appear to be doing—but little quarter will be given the chiseler.

Up in the Pacific Northwest scrap buyers are looking for a price drop. This hope is based on an increase in shipbreaking activity plus a lowered pressure from eastern buyers. Dealers don't share this view, although they do admit that pressures can be effective, as dealers aren't too well organized and often subject themselves to special "deals" for fear that one of their competitors might toherwise underbid them.

Neither buyer nor seller of scrap can be drawn into an admission that prices are going higher. An unspoken consensus is that the price is about at its top and that from here on there is nothing but a down grade ahead. Bona fide dealers who have won the respect of buyers during a more or less crucial period frankly state that with the profits they have been able to make from nonferrous metals sales and specialties they are "doing all right."

In Four Great Industrial Areas . . . RB&W Makes Strong the Things That Make America Strong

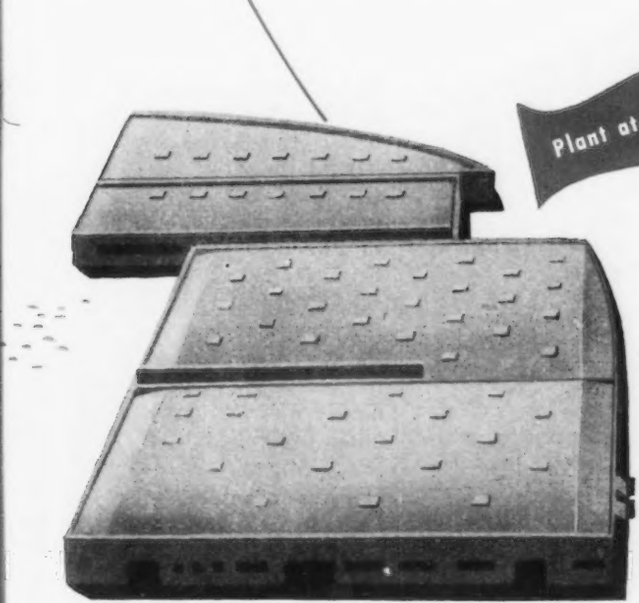
This is America at its best . . . resourceful and enterprising.

103 years ago, a tiny factory in the small New England town of Pemberwick, Connecticut.

Today—four great fastener manufacturing plants, each at the heart of a major industrial area . . . representing investments of many millions of dollars in plants and equipment . . . producing more than 6,000,000,000 fasteners per year.

Tomorrow—an even deeper integration into the structure of American industry. Equipped with the fastener industry's finest facilities—both in a geographical and technological sense—RB&W's current commitments call for $3,500,000 for improved facilities, plant expansion, research and development.

Wherever American industry moves forward, RB&W will be a vigorous part of it, helping it to meet whatever challenge it may face . . . with products and services that match the highest standards of our customers.



Pictured are the four RB&W plants—at Los Angeles (Cal.), Rock Falls (Ill.), Coraopolis (Pa.), and Port Chester (N. Y.)—*providing the broadest geographical coverage of any bolt and nut manufacturer.*

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

PERSONALS

o o o

• **Edwin L. Tindall** and **Sigurd Landen** have been appointed chief engineers for the Pittsburgh and Chicago districts respectively, Carnegie - Illinois Steel Corp., Pittsburgh. Mr. Tindall joined Carnegie-Illinois as a combustion engineer at the company's South Works in Chicago in 1935. He joined the engineering division in Pittsburgh in 1940 as a power, fuel and steam engineer. He was made chief engineer of the company's Edgar Thomson Works in 1947, the position he held at the time of his present appointment. Mr. Landen joined Carnegie-Illinois in 1924 as a draftsman at the company's Gary Steel Works. After several promotions, he was made assistant chief engineer of the plant in 1945 and chief engineer in 1947.

• **James E. Pollak** has been appointed manager, construction materials, of the Southwest Steel Rolling Mills, Los Angeles. Mr. Pollak was formerly an executive of the Pollak Steel Co., Cincinnati.

• **Ernest E. Brayshaw** has been named works manager of Southwest Steel. Formerly assistant division superintendent of the Carnegie-Illinois Steel Corp., Clairton works, Mr. Brayshaw entered the steel business as a roll designer for the Bethlehem Steel Co.

• **A. N. Morton** and **A. C. Fetzer** have been elected vice-presidents of Mack Trucks, Inc., New York. **F. R. Harrison** has been elected to the offices of assistant secretary and assistant treasurer. **T. Wroldsen** has been made an assistant secretary and **J. A. Jackson,** an assistant treasurer.

• **Dale D. Spoor** has been appointed sales promotion manager of Air Reduction Sales Co., New York. **Russell S. Schmidt** succeeds Mr. Spoor as dealer sales manager.

• **C. Richard Newpher,** production manager of the Ivanhoe Div. of the Reliance Electric & Engineering Co., Cleveland for the past 2 years, has been made division manager as well.

HOWARD J. ELGIN (left), and CHARLES H. ROPER (right), vice-presidents, Steel Sales Corp.

• **Howard J. Elgin** and **Charles H. Roper** have been elected vice-presidents of the Steel Sales Corp., Chicago. Mr. Elgin served with the corporation in 1935 as a student salesman and served in various capacities until he became manager of monel and nickel sales in 1944. Mr. Roper began with the company as a warehouse clerk in 1927. He later served as a salesman in the Milwaukee and Minneapolis territories and was appointed manager of the Steel Sales branch office and warehouse in St. Louis in 1934. Since then Mr. Roper has been in charge of sales in the Missouri, Southern Illinois, and Western Iowa areas.

• **Lee Stratton** has been appointed merchandise director of the parts division of the Reynolds Metals Co., Louisville. Mr. Stratton comes to Reynolds from the Crosley Div. of the Avco Mfg. Corp. in Cincinnati, where he has been serving as domestic sales manager.

• **D. G. Davie** has been appointed district sales manager of the Eastern Stainless Steel Corp., with headquarters in Buffalo.

• **John E. Heuser,** formerly with the engine and compressor products division of the Le Roi Co., Milwaukee, has been named assistant sales manager of the firm and will take over the duties formerly held by C. W. Brown, who has resigned.

• **Preston H. Haskell, Jr.,** former vice-president in charge of coal mine operations and coal sales for the Alabama By-Products Corp., Birmingham, has become president of the Southern Minerals Co., also of Birmingham.

• **T. H. Bateman** has joined the sales department of Pipe & Tubular Products, Inc., Philadelphia, as a special representative and is in charge of railroad sales. Mr. Bateman has been identified with the W. H. S. Bateman & Co. for the past 15 years.

• **W. E. Jones,** for the last 4 years representative in eastern Pennsylvania, New Jersey, Delaware and Maryland, with headquarters in Philadelphia, for the National Engineering Co. of Chicago, has been transferred to Detroit to handle the State of Michigan. **E. C. Troy** has resigned as vice-president of the Dodge Steel Co. in Philadelphia to act as National Engineering's new service and sales engineer in the territory formerly serviced by Mr. Jones. **Frank Jensen,** who has been with the company since 1936, has been made district manager of the north central division, which takes in Michigan, Ohio, Dominion of Ontario and Dominion of Quebec. **Fred W. Fuller,** who has been foundry engineer in the State of Ohio, becomes special agent and will concentrate his activities in the northern half of the state. Mr. Fuller also represents Foundry Equipment Co. of Cleveland.

This handy pocket size CATALOG SHOULD BE IN EVERY TOOL AND DIE SHOP

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Analyses and properties of Latrobe Electric Steel Company's Tool and Die Steels.

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- Forms in which these steels are furnished.
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Here, indeed, is a booklet that is far more than a mere catalog. It is published by Latrobe Electric Steel Co. as a service to shopmen, tool and die makers, foremen and engineers. It is replete with useful information in handy reference form and contains data and descriptions of popular Latrobe Electric Steel Company high-speed steels and tool and die steels.

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Gentlemen: Please send me, without obligation, your catalog covering Latrobe Electric Steel Co. High-Speed Steel and Tool and Die Steels.

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ATTENTION OF_____ TITLE_____

• **H. S. Baker,** formerly Nash Motors Div. zone manager at Denver, has been appointed zone manager at Cincinnati. He succeeds **E. D. Howerton** who has resigned to join a Nash dealership in Oklahoma.

• **John S. Richards** has been appointed director of foreign exchange for the International Div. of Ford Motor Co., Dearborn, Mich. Mr. Richards entered the service of the U. S. Treasury Dept. as a commercial specialist in 1941, advancing to director of foreign funds control in 1946. He will assume his duties with Ford about Apr. 1.

• **R. R. Rolph** has been named sales manager of the automotive division of Monroe Auto Equipment Co., Monroe, Mich. Mr. Rolph was formerly associated with Borg-Warner, Detroit.

• **F. F. Bain** has been appointed to the newly-created position of stainless steel service metallurgist with Atlas Steels Ltd., Welland, Ont. He was with the Eastern Rolling Mills Co. from 1931 to 1935 as assistant metallurgist. In 1936 he joined Rustless Iron & Steel Corp., Baltimore. In 1947 he was chief metallurgist of the Baltimore Castings Corp. and at the same time was retained by Atlas Steels Ltd. as stainless steel consultant.

• **E. H. Horstman** and **Hans P. Dahlstrand** have been named respectively chief engineer and director of engineering of the Allis-Chalmers Mfg. Co.'s steam turbine department, Milwaukee. **Mr. Horstman,** formerly assistant chief engineer of the Allis-Chalmers steam turbine department has been with the company since 1923. **Mr. Dahlstrand** has been associated with Allis-Chalmers since 1904, and has held the positions of engineer-in-charge, chief engineer, and more recently consulting engineer of the company's steam turbine department. **A. F. Rolf,** an assistant secretary of Allis-Chalmers for more than 25 years and associated with the firm's New York district office for nearly 45 years, has retired.

LESLIE McARTHUR, vice-president, Niles-Bement-Pond Co.

• **Richard F. V. Stanton,** vice-president and assistant sales manager of machine tools, Niles-Bement-Pond Co., West Hartford, has resigned. **Leslie McArthur,** manager of the Chandler-Evans Div., has been elected a vice-president of Niles-Bement-Pond. Mr. McArthur joined Niles-Bement-Pond Co. in 1947.

• **Harry M. Hubbard** has been appointed district representative for the Cleveland and Northeastern Ohio territory of the Waltham Grinding Wheel Co., Waltham, Mass.

• **I. P. Smith,** formerly president of the Hettrick Mfg. Co., Toledo, has been elevated to the newly-created position of chairman of the board. Succeeding **Mr. Smith** as president is **W. I. Smith,** formerly executive vice-president.

• **Emil G. Schmidt** has been named foundry superintendent and **William R. Myers** becomes head of the stamping division of Studebaker Corp., South Bend, Ind. Mr. Schmidt was in charge of foundry operations for International Harvester Co. for many years at the company's Rock Island, Indianapolis and Louisville plants. Mr. Myers was formerly plant manager for Briggs Body Div. at LeBaron. He later became associated with the Fruehauf Trailer Co., Detroit.

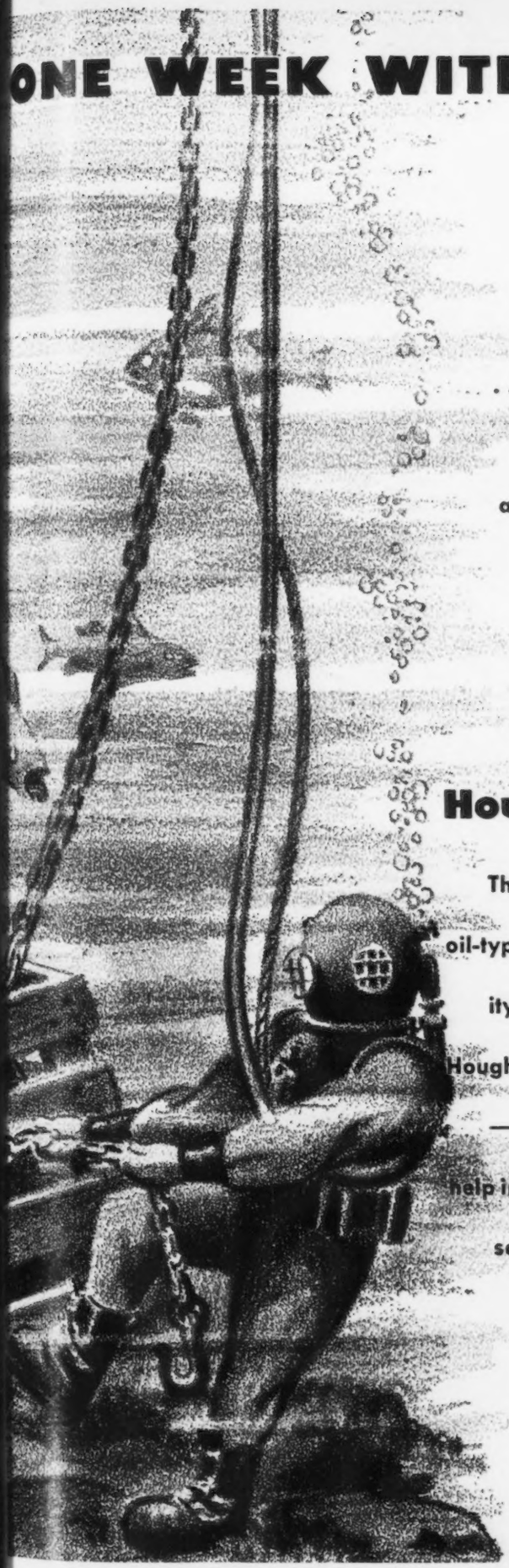
• **E. G. Warren,** formerly a representative in the Philadelphia area, has been transferred to the Northern Ohio and Northwestern Pennsylvania territory, and **C. Harvey Anderson** has been shifted from Chicago to the Wisconsin and Minnesota territory of the Pennsylvania Salt Mfg. Co., Philadelphia. Both men have been with Pennsalt since 1943. **A. C. Jones,** manager for the past several years of Pennsalt's order and warehousing division, has returned to his former position as a sales representative in the Philadelphia area. Mr. Jones has been with Pennsalt since 1919. **Harold S. Davenport** has joined the division and now is undergoing training at the Philadelphia office.

• **Milton J. Scott** has been appointed assistant director of research of Monsanto Chemical Co., Merrimac Div., Everett, Mass. Mr. Scott has been a research chemist or group leader at Monsanto's plastics division in Springfield since 1942.

• **E. C. Blackwood** has been appointed sales representative in the Cincinnati area of Bedford Tool & Forge Co., Bedford, Ohio.

• **W. K. Cox** has been appointed advertising manager, Caterpillar Tractor Co., Peoria, Ill., succeeding **Gerald M. Walker,** retired, who has headed the department since 1931. Mr. Cox became associated with Caterpillar at its San Leandro plant in 1928, and has served as supervisor of industrial advertising, assistant manager of sales development, district representative in the southern states and assistant manager of the eastern sales division. He was named assistant general sales manager in 1944. **J. J. Valentine,** central division sales manager, who has been associated with the company since 1929, will succeed Mr. Cox.

F. D. Haberkorn, who has been associated with the company since 1935, succeeds **Mr. Valentine** and **J. W. Mohler** succeeds **Mr. Haberkorn** as sales training division manager. **Herman S. Eberling,** currently a western division district representative, succeeds **Mr. Mohler** as assistant central division sales manager.



ONE WEEK WITH DAVY JONES—

and on the dock

for one year afterward

. . . that was the fate of nineteen machines shipped in open crates to the Argentine, and accidentally dropped overboard when unloading. Inspected a year later, they showed

absolutely no rust . . .

thanks to

Houghton's Rust Preventive

The machines had been so well protected by this oil-type preventive that they withstood high heat, humidity, salt water and salt air—a tough combination. Houghton's Rust Preventives—Cosmoline and Rust Veto—have been industry's standard since 1867. For help in today's fight against rust, write for the booklet describing "The Winning Nine from The Houghton Line".

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303 W. Lehigh Ave., Phila. 33, Pa.

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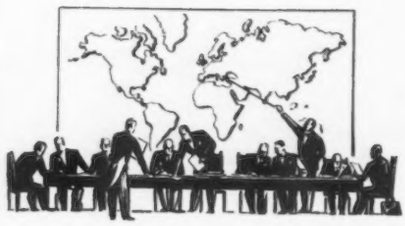
COSMOLINE

FIGHTS RUST

European Letter . . .

• Need for European aid imperative as dollar reserves near exhaustion . . . Americans regard ERP as a program designed to make European self-help possible . . . If not, further appropriations will become more difficult.



LONDON—As the dollar reserves of Europe run out, Interim Aid becomes exhausted and gold sales reduce nations to the edge of insolvency, more than one statesman is gazing across the Atlantic, attempting, with growing anxiety, to assess the scale of assistance on which the European nations can count and the speed with which they are likely to receive it.

The prospects that confront them are neither uniform nor easy to interpret. The Bill authorizing the European Recovery Program has passed its first milestone—the conclusion of hearings in the Foreign Affairs Committee of the Senate—and has been approved in great style by a unanimous recommendation, confirming all the chief features of the Administration's project and making a number of improvements.

Yet this milestone marks only a quarter of the distance still to be covered. The Senate as a whole must discuss and approve the Bill. The House of Representatives must finish its hearings and approve a Bill first in the Committee on Foreign Relations, then on the floor of the House. Only then can the two Houses come together to work out a Bill acceptable to both.

Opinions differ about the length of time these various stages of the debate will take. Senator Vandenberg insists no less strongly than the Administration that the Bill must be enacted by Apr. 1. But influential members of both Houses are asking what is the hurry and suggesting that May and June will be time enough.

These discordant voices are a reminder that the European Cooperation Act (the Bill's official name) is being discussed, not in a political vacuum, but in an atmosphere tense with the hopes, fears, ambitions and inhibitions of a Presidential election year. The Republican Party, the majority party in Congress, is pledged to achieve a measure of reduction in taxes. It has stated its aim of removing $2.5 billion from the President's Budget figure of $39.7 billon.

At the same tme, an election year is no time to cut domestic expenditures. Only recently, a Bill to provide more money for the training of veterans passed both Houses and added some $500 million to authorized expenditure. In these circumstances the temptation, so far resisted with reasonable success in the Senate, to begin pruning the President's proposals for foreign aid may prove almost resistible in the more volatile House of Representatives, especially since the size of the sum proposed for all relief and occupation overseas for the next 15 months—some $9,300 million—positively invites the Congressional axe.

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A FURTHER factor of uncertainty in judging the American scene appeared precipitately a short time ago. After 2 weeks' downward drift, prices for wheat and corn suddenly slumped in the Chicago grain pit. After reaching the highest price for grain ever realized in American economic history (over $3 a bushel) the market broke and fell continuously until prices fell to the level of June last year. Does the break in prices herald the onslaught of a depression? In 1921, the fall in grain prices spread to the whole economy and ushered in a short but violent slump. On the other hand, a slight break in prices first in 1946 the in 1947, both interpreted as signal of a recession at the time, proved t be no more than wobbles in a risin line.

The economic prophets in Amer ica are proving much more cautiou on this occasion, and even whil they predict no recession, they ar conscious of the strength of th purely subjective factors whic have to be taken into account. "Bus iness confidence" is both the mos vital and the most unpredictable element in the trade cycle.

However, with all these precau tions in mind, most American com ment suggests that the break i grain prices merely marks the en of excessive price inflation brough on in recent months by the belie that the American harvest woul be small and that the whole worl would be fighting for it. It is now clear that it may be big and tha Europe's harvests, too, will also b more favorable. If this analysis i correct, the recent fall in America grain prices may be of some assistance to the passage of ERP. On the one hand, dollars spen under the program will buy more food. On the other, the farming *bloc* may begin to display more in terest in the maintenance of their markets abroad.

CAUTION is, now as always, a vital instrument in analyzing the state of a union as vital, turbulent and complex as the United States. Yet there may be ground for reasonable optimism. It is not only that the economic position seems to be growing a little easier. The political situation is more promising than anyone a year ago had a right to hope. In March and April 1947, many weeks of grudging, disgruntled debate were necessary to obtain $400 million for aid to Greece and Turkey and the country at large made little secret of its dislike for the Truman Doctrine. Today, even if the unanimous approval given to ERP by the Senate Committee on Foreign Affairs is the first and not the last step in the

THE UDYLITE WAY...

• *At least 50% increase in plating speed*—that's the proved accomplishment of Udylite's Bright Nickel Process.

This means 50% more plating with the same voltage, in the same time, without additional manpower or costly equipment alteration.

The Udylite Way to faster bright nickel is based on specially developed Udylite Brighteners in a high-chloride bath. The result is not only *faster* plating but definitely *better* plating because the Udylite Process offers the following advantages: Exceptional tolerance to contamination; uniform deposits over a wide range of current densities; high rate of brightening; less tendency to form nodules; simple to operate and control.

A Udylite Technical Man will gladly tell you all the details of the Udylite Bright Nickel Process and show you how Udylite research has developed processes tailored to your own plating need. Write, wire or 'phone the Udylite Corporation, Detroit 11, Michigan. Offices in Principal Cities.

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Bill's legislative journey, it is, nevertheless, a very significant one.

There is much evidence to suggest that the House of Representatives will be strongly influenced by the Senate and it is clear that Senator Vandenberg has established an undisputed position of leadership in the Republican Party. It is above all to his guidance that the safe passage of the Bill through the Committee stage is due. His compromises have saved the day when a number of ugly deadlocks threatened to arise.

For instance, while insisting on the moral obligation to continue the Aid Program through 4 years, he suggested the withdrawal of the President's proposal of $17 billion for the full period on the sensible grounds that in the fluid state of the world, it could not be said whether the sum would prove too little or too much. Again, he found a way between the President's demand that the administrator of ERP should be virtually an assistant secretary in the State Dept., and the Republican desire for an independent corporation staffed with business men. He proposed instead a single Administrator who would have separate Cabinet rank and whose disputes (if any) with the State Dept. would be settled by an appeal to the President.

Again, in the most difficult issue of all, upon which the "isolationists," Senator Taft and Mr. Hoover, had fastened — whether the proposed first installment of $6,800 million is not, in fact, too large— Senator Vandenberg saved the principle by limiting the appropriation to the period running from April to January and settling for $5,300 million, $3 billion of which will be set aside from the large surplus achieved under the 1947-48 budget.

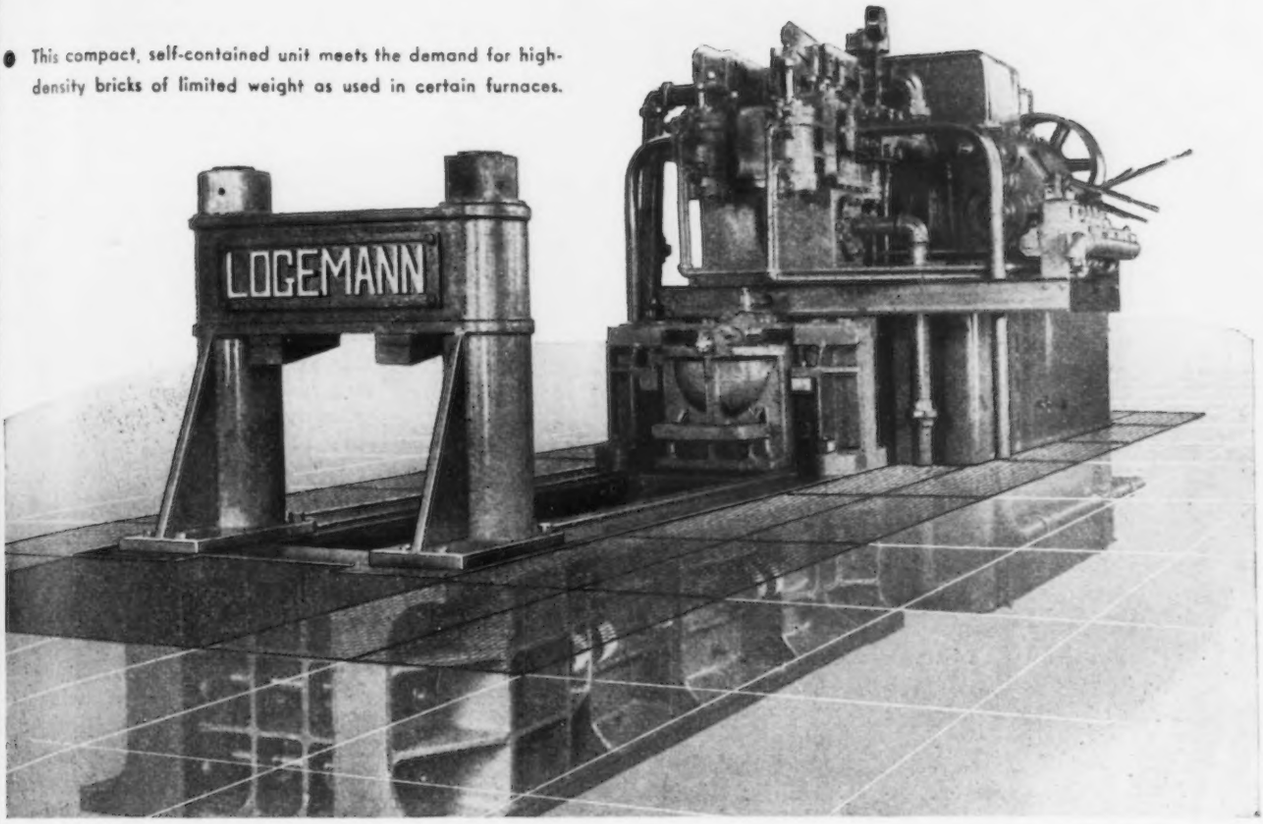
NOR have Senator Vanderburg's achievements been merely tactical. He must share with Mr. Marshall the most notable achievement of contemporary American politics—that in an election year the greatest issue in foreign policy, aid to Europe, has remained firmly bipartisan. Both men have been assisted by responsible leaders outside Washington — including Governor Dewey, Mr. Stassen, and John Foster Dulles.

But it is in Washington that most of the harm could have been done. Attacks there have been.

For High Density Bales . . use the Self-Contained

LOGEMANN Scrap Presses

● This compact, self-contained unit meets the demand for high-density bricks of limited weight as used in certain furnaces.



Press, Pump, Tank . . . all in one compact assembly

Available with Automatic Control

Both two and three ram models are available with automatic controls . . . and are recommended when the nature of the scrap warrants such application and where high output is desired.

You conserve floor space and piping in plants and yards where space is limited . . . and at the same time, handle high tonnages at extremely low operating cost.

Pioneers in the metal baling field, LOGEMANN engineers have embodied the features proved through actual operation to be essential to constant, uninterrupted service. These same engineers are prepared to offer suggestions as to operating layout and installation of any unusual or specific need. Present your problem to them, stating the nature of your scrap and the tonnage desired. There is no obligation.

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For instance, it is from opponents of the whole conception of ERP that the driving force has come to get more aid for China, if necessary at the expense of Europe. And there have been constant attempts to get the actual figure reduced. Yet the sniping on the side has not yet modified the remarkable fact of a Democratic President and a Republican Congress pursuing jointly a really revolutionary and anti-isolationist foreign policy in election year.

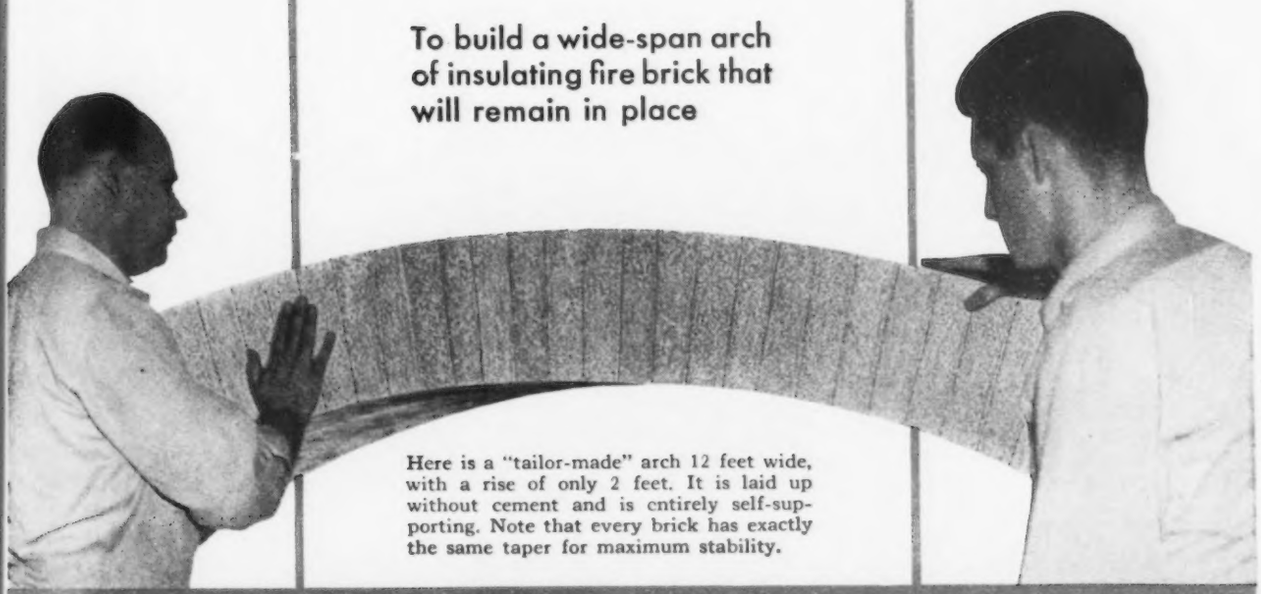
Perhaps this fact of anti-isolationism is the most remarkable of all. Who would have thought that within a year of the hotly contested Truman Doctrine, an isolationist should be one who "thinks that $4 billion is quite enough for Europe this year?" The revolution in American thinking in the last 2 years has scarcely a parallel in history, and it has been accomplished, not by the drumming propaganda of some totalitarian tyrant, but by the spontaneous movement of a freely-thinking people.

At this point there may be some people in Europe, particularly in this country, who will be tempted to lean back and argue: "American aid is certain. Our troubles are over. We can now rely on 4 years of dollar aid. All the expedients and policies we thought might be necessary can now be set aside." No state of mind could be more mistaken or disastrous. If one thing emerges more clearly than any other in the hearing of evidence in the Senate—evidence by the government, public servants, leaders of public opinion, distinguished private citizens of the quality of Bernard Baruch, evidence even by the lunatic fringe—it is that the Americans regard ERP as a program designed not so much to help Europe as to make European self-help possible.

The critics have already given notice of the line they will pursue —that Europe is simply waiting to get its hands into the American pork barrel and that gestures of self-help will end the moment it does so. Senator Taft has departed to the country with such forebodings in mind. Others—particularly in business circles—are already expressing the same views openly. On the whole, debates, official and othewise, have been remarkably free of any desire to "put strings

Do you have a furnace problem like this?

To build a wide-span arch of insulating fire brick that will remain in place



Here is a "tailor-made" arch 12 feet wide, with a rise of only 2 feet. It is laid up without cement and is entirely self-supporting. Note that every brick has exactly the same taper for maximum stability.

Here's how it can be solved:

The ordinary method of constructing a furnace arch is to use alternate straight and wedge brick. In this type of construction, the parallel faces of the straight brick offer little keying action, and the brick are apt to slip when the furnace is heated and cooled. Continued movement of the arch in service pinches and crumbles these loose brick, causing failure of the arch construction.

With Armstrong's "Tailor-made" arches, this problem is eliminated. Each insulating fire brick is cut to exactly the same size and taper. This provides for more positive keying action, with a structural stability that cannot be obtained with straight and standard arch and wedge brick.

Armstrong's "Tailor-made" arches are available in all five types of Armstrong's Insulating Fire Brick, for temperatures from 1600° to 2600° F.

Armstrong's engineers are experienced in solving the insulation problems which furnace builders face in designing new or improved equipment. You can get their advice without obligation by calling the nearest Armstrong office.

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Send today for "Engineering Problems That Have Been Solved With Armstrong's Insulating Fire Brick." Just write to Armstrong Cork Co., Industrial Insulation Dept., 4903 Mulberry St., Lancaster, Penna.

ARMSTRONG'S INSULATING REFRACTORIES

on American aid" and most Americans go out of their way to disclaim any intention of intervening in other countries' political and social affairs. But they cling all the more tenaciously to the demand that Europe shall show signs of a vigorous will to recovery and that it shall pursue that recovery not as a queue but as a team.

THE reason why Mr. Bevin's speech adhering to the concept of Western Union aroused such astonishing applause in the United States was that it put an end to a period of doubts whether Britain might not in fact be sabotaging Western association. Disappointment and anger will be all the greater if, after many fine words, not a single concrete consequence is worked out.

One thing and one thing only could turn the United States back in its tracks and send it off down the old road of isolationism: The conviction that Europe's protestations of work and unity were simply window-dressing designed "to make Uncle Sam a sucker once again."

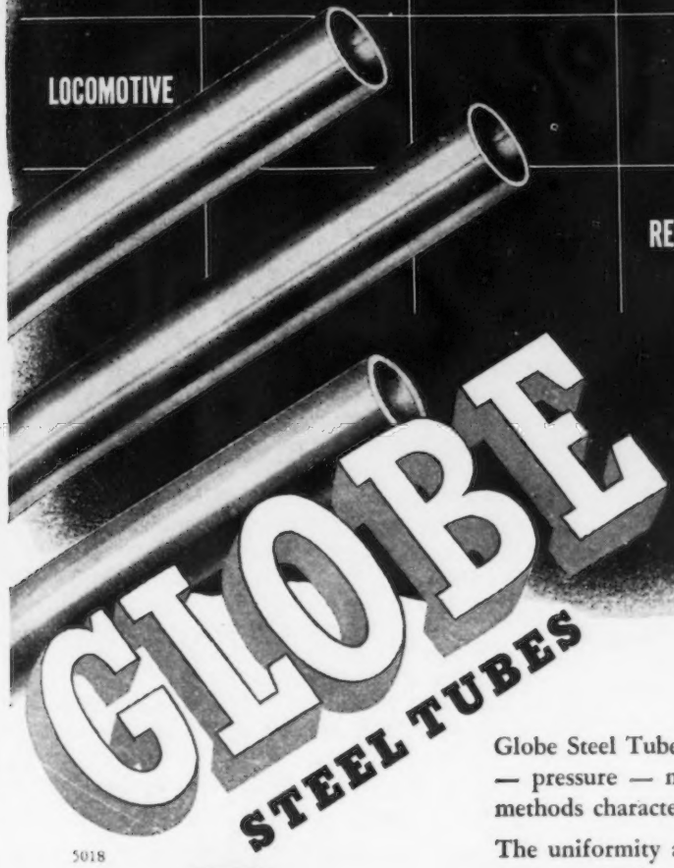
Of all issues connected with ERP, this is the most urgent. The need for American aid to Europe not only this year, but for 3 or 4 years to come is admitted by all, but perhaps Europeans should be reminded that that aid will be allocated year by year, by separate Congressional appropriations, each accompanied by the closest scrutiny of Europe's achievements that a highly critical body can apply. If the record of Europe is to be that mixture of great phrases and virtual inaction which is all there is to show for the first 2 months of 1948, then it is a fair prophecy that the second appropriation will be voted with distaste, the third with difficulty and the fourth appropriation not at all.

•

SALT LAKE CITY — Geneva Steel Co. has let the first major contract for conversion of its plate mill to production of hot-rolled coils to the Walsh Construction Co., Davenport, Iowa. The contract involves $3 million and covers foundations for plate mill extensions, pipe and electrical work and some machinery installation.

No Matter what Class or Type of Steel Tubing you need--

CARBON	STAINLESS WELDED (Gloweld)	HIGH DUCTILITY	HIGH TEMPERATURE SERVICE	CORROSION RESISTANT	AIRCRAFT
HIGH MAGNETIC PERMEABILITY	ALLOY	HIGH PURITY IRON (Globeiron)	STRUCTURAL	PRESSURE	SPECIAL ANALYSES
AUTOMOTIVE	POLISHED	STAINLESS SEAMLESS	COLD DRAWN	CONDENSER AND HEAT EXCHANGER	SPECIAL SHAPES AND FORMS
LOCOMOTIVE			TOUGH	ANNEALED	MECHANICAL
			RECTANGULAR	ROUND	SQUARE



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Industrial News Summary...

- **Steel Gray Market Cracking Up**
- **Conversion Deals Now Falling Off**
- **Regular Steel Demand Unaffected**

THE steel gray market this week is on the ropes. One more heavy punch will knock it out. High premium prices obtained no more than a week ago are finding few if any takers this week. Steel consumers who a month ago were anxious to buy steel at gray market prices are staying away from such sources in droves.

While it is true that a considerable amount of steel is still being sold in the premium market at higher than mill prices, the crackup in the super gray market will begin to filter down. Already conversion deals which utilize ingots purchased on the outside and processed into flat-rolled material are falling apart in those instances where third quarter demand was involved.

Conversion operations for the first and second quarters of this year are still being held intact. Beyond that date there is a wall of silence which is causing first class jitters for ingot makers who have supplied the raw material.

Automotive companies are the chief factors in putting up resistance against conversion deals beyond the second quarter of this year. One of the large automotive companies has even broken up its conversion plans for the second quarter and spewed its unconverted material into the open market for sale—with few takers.

IT is now certain that hundreds of steel fabricators who were willing to go into the steel gray market in order to turn their backlogs into finished products are now backing water. They will not pay the high premium prices, and even spot business is being postponed this week in many cases. A large number of small steel consumers are rearranging their schedules on the basis on deliveries from normal steel sources.

Despite the cracking-up in the steel gray market and the hesitancy on new conversion deals, normal steel market demand continues at an all-time high. There is little or no chance that the decline in the purchase of premium priced steel will have any effect on regular steel orders for some time to come. The refusal of consumers to pay premium prices or to enter into additional complicated conversion arrangements will put strong pressure on steel mills to take more regular orders and to quicken deliveries.

How much the falling gray market will affect regular steel demand depends on consumers' inventories. Most gray market activity was supported by consumers who sold excess or unbalanced inventories to brokers or other users at premium prices. The amount of gray market steel changing hands has never been more than 5 pct of total steel shipments. On this basis it is doubtful if steel companies will see any effects on their flow of orders or production for many months to come, if then.

Basic factors behind the falling apart of the premium steel market are: (1) Nervousness over consumer and light product demand on the part of the public, (2) ability of many fabricators to quickly reduce their unfilled orders by turning them into finished products made from steel, (3) the desire to get the full benefit of the weakness which has appeared in the gray market prices and (4) setting up production schedules on the basis of regular steel mill and warehouse shipments.

MOST steel officials hold to the belief that basic steel demand will support high steel operating rates for many months to come. Oil, gas and water pipe requirements are so heavy that it may take a few years, at the minimum, to supply the material needed by those industries. Pipe line requirements alone are tremendous.

The automotive industry may give the premium steel price market a wallop, but auto backlogs are heavy enough to keep that industry at peak steel demand for some time to come. While the heavy industries are taking a second look at their backlogs and trying to forecast future demand, their steel requirements are expected to be heavy for some time.

Steel operations this week are up to 96 pct of rated capacity, an increase from last week's revised rate of 94.5. This places raw steel output at previous peak levels. A better flow of scrap and a good repair and maintenance cycle may support peak operations for the next several months.

No important trends are sighted this week in the iron and steel scrap market. It appears that current prices are now going through the fourth round of testing since the decline in quotations started late last year. The scrap trade is not unanimous that the price trend is downward. But consumers are exerting their influence by remaining choosy.

THE IRON AGE composite this week is down 25¢ a gross ton to $39.75 a gross ton. This establishes a new low mark since the first of the year. The price of heavy melting steel went off a dollar at Philadelphia but an average increase of 25¢ a ton was registered at Chicago.

THE steel price situation this week was somewhat like Joseph's coat—there were several variations in the price of some flat-rolled material, in the extra charges for structural shapes and in the price of wire rods. The spotlight on steel prices turned on at Washington last week will probably hold them in status quo for the next several weeks. It is likely that the recent change in structural extras will become uniform among all producers and there is a good chance that wire rods will be advanced on the basis that costs are too high or that the product is being made at a loss.

• **ACCENT ON MELTING**—Allegheny Ludlum Steel Corp., reporting on its $24 million modernization program, lists oxygen melting equipment and other improved melting processes as among its most urgent projects. In its recently published annual report, the company divides the program into three parts: (1) replacement of present machinery with more efficient models; (2) modernization of existing equipment to broaden the range of products; and (3) installation of new equipment including a new process for melting stainless steels and more oxygen melting machinery.

• **ATOMIC STUDIES**—The installation to be operated in Miamisburg, Ohio, by Monsanto Chemical Co. for the Atomic Energy Commission, has been officially named the Mound Laboratory." Originally the facility was to be called unit No. 5 of Monsanto's central research department. Approximately 450 Monsanto personnel will conduct chemical studies in nuclear science, developing and testing processes, procedures and techniques which will be applied to the operations of the atomic energy program.

• **FREIGHT CARS**—Freight car output in February was 8463 cars, as compared with 2293 in February 1947, the American Railway Car Institute says. The February figure includes 6306 cars built by the car builders and 2157 by railroad shops. Deliveries were lower than in January (8949) and in December (9823) because of bad weather, gas shortage and continuing lack of certain types of steel, the institute said.

• **CHAIN LETTERS**—A campaign has been launched by the Chicago Assn. of Commerce and Industry to relieve the shortage of steel and iron scrap. A letter urging renewed collection efforts and offering a number of suggestions for increasing the supply of scrap metal has been sent to 5000 member firms. The member firms are requested to write similar letters to their suppliers, dealers, branches and customers.

• **FIRST TIME**—For the first time under the new Labor-Management Act, the NLRB has ordered an election to be held in a strike-bound plant—the Pipe Machinery Co. of Cleveland. Terming the walkout "an economic strike," the Board ordered an election within 30 days and ruled that since the plant had reopened, all persons hired since the strike began should be permitted to vote along with the strikers.

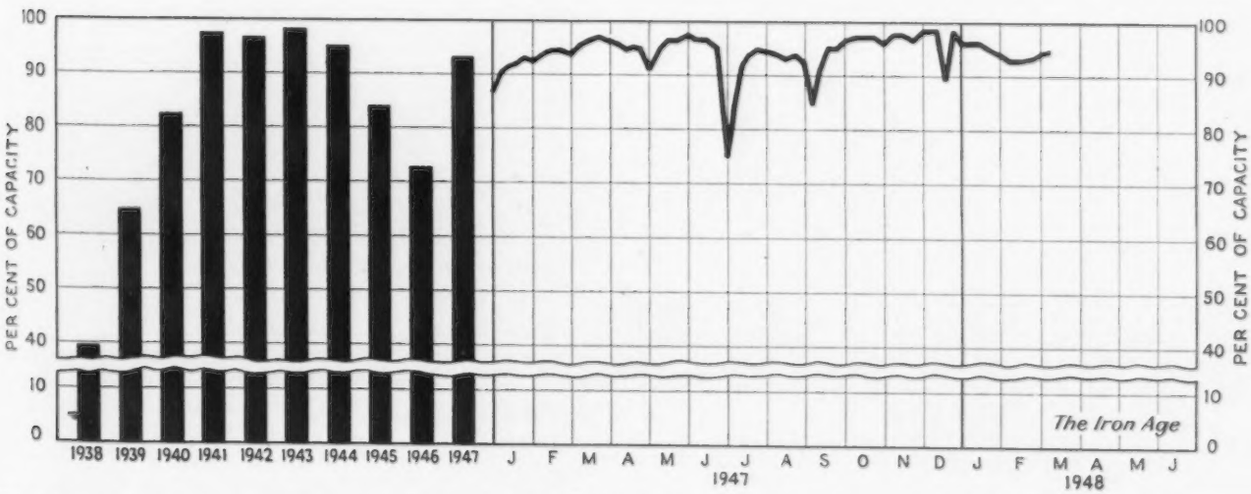
• **HOT-ROLLED ARRANGEMENT**—Steel Producers, Inc. have leased space in the Toronto plant of Follansbee Steel Corp. In it they are installing equipment for production of hot-rolled sheets. Arrangements have been made with Follansbee to process the product of Steel Producers' hot-mill equipment into finished sheets. Unidentified "end users" have acquired an interest in Steel Producers, Inc. and substantial parts of the corporation's production will be purchased by them.

• **PLANT SOLD**—All assets of the Buffalo Gasolene Motor Co., manufacturer of gasoline and diesel engines, have been acquired for an unidentified group of Cincinnati and Buffalo men. The purchase price was reported to be "more than $250,000." The company's plant at 1280 Niagara St. is continuing to operate under the new management.

• **OIL STORAGE**—A surplus oil terminal at Jacksonville, Fla., has been acquired by the Navy Dept. from WAA for $268,664. Among facilities are two 55,000-gal and two 80,000-gal storage tanks, with suction heaters and lines capable of handling 25,000 bbls of oil a day.

• **EXPERIMENTAL WORK**—Portions of a surplus magnesium plant at Spokane, Wash., have been leased to the Chromium Mining & Smelting Co., Chicago, and Pond Orielle Metals & Mining Co., Spokane, for 5 years. Experimental work in production of ferrosilicon, ferroalloys, and metallic zinc will be carried on by the lessees.

Steel Ingot Production by Districts and Per Cent of Capacity



Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
March 2	99.0*	94.5	92.5	88.0	91.0	10.20*	97.0	103.0	101.0	97.5	103.0	77.5	96.0	94.5*
March 9	98.5	94.0	92.5	90.0	94.0	10.20	97.0	103.0	101.0	104.0	104.0	78.0	100.0	96.0

* Revised

Revised...

AT YOUR FINGERTIPS

Standard Designations and Chemical Composition Ranges for Heat and Corrosion Resistant Castings have been revised by the Alloy Casting Institute. The chart below puts all this data conveniently

DESIGNATION	Co...tion —							
	C	Mn max.	Si	P max.	S max.	Cr	Ni	Other Elements
CA-15	0.15 max.	1.00	1.50	0.04	0.04	11.5-14	1 max.	Mo 0.5 max.†
CA-40	0.20-0.40	1.00	1.50	0.04	0.04	11.5-14	1 max.	Mo 0.5 max.†
CB-30	0.30 max.	1.00	1.00	0.04	0.04	18-21	2 max.	—
CC-50	0.50 max.	1.00	1.00	0.04	0.04	26-30	4 max.	—
CE-30	0.30 max.	1.50	2.00	0.04	0.04	26-30	8-11	—
CF-8	0.08 max.	1.50	2.00	0.04	0.04	18-21	8-11	—
CF-20	0.20 max.	1.50	2.00	0.04	0.04	18-21	8-11	—
CF-8M	0.08 max.	1.50	1.50	0.04	0.04	18-21	9-12	Mo 2.0-3.0
CF-12M	0.12 max.	1.50	1.50	0.04	0.04	18-21	9-12	Mo 2.0-3.0
CF-8C	0.08 max.	1.50	2.00	0.04	0.04	18-21	9-12	Cb 8xC min., 1.0 max.
CF-16F	0.16 max.	1.50	2.00	0.17	0.04	18-21	9-12	Mo 1.5 max., Se 0.20-0.35
CF-16Fa	0.16 max.	1.50	2.00	0.04	0.20-0.40	18-21	9-12	Mo 0.40-0.80
					04	20-23	10-13	—
					04	22-26	12-15	—
					04	22-26	12-15	—
					04	23-27	19-22	—
					04	26-30	4 max.	Mo 0.5 max.†
					04	26-30	4-7	Mo 0.5 max.†
					04	26-30	8-11	Mo 0.5 max.†
					04	18-23	8-12	Mo 0.5 max.†
					04	24-28	11-14	Mo 0.5 max.† N 0.2 max.
					04	26-30	14-18	Mo 0.5 max.†
					04	24-28	18-22	Mo 0.5 max.†
HU	0.35-0.75	2.00	2.50	0.04	0.			
HW	0.35-0.75	2.00	2.50	0.04	0.			
HX	0.35-0.75	00	2.50	0.04	0.			

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Long Term Outlook For Nonintegrated Steel Mills Is Cloudy

New York

• • • **Former** owners of nonintegrated steel mills which sold their plants in the past few years probably knew what they were doing. Small steel plants now in business are paying higher prices for their raw materials. But demand is heavy for steel, so they can raise their prices on finished steel to make up for raw material price rises. Selling is no problem now.

But when steel markets return to normal, premium prices will not be paid. Small mills will have to reduce their prices to remain competitive with big mills. If major mills have not raised their products by that time to the level of the smaller mills, the margin between raw steel costs and finished prices will be much less than it was early in January 1948.

This means that small mills will suffer a loss in their profit because semi-finished steel prices will be relatively higher. Major steel companies selling semifinished steel will no longer be content to lose money on these products. They will not be expected to reestablish the old margin. Expansion plans among the large companies call for more finishing mills. This means greater use of raw steel within the larger companies' own plants—and less for outside sales.

Smaller steel plants which make specialty items—electrical sheets, special sizes and grades of strip, thin gaged annealed sheets and other high quality items—can stand the future. But smaller mills making regular commercial grades of flat-rolled steel may find the going too rough.

•

Hike in Semifinished Prices Offset by Smaller Mills Upping Their Prices

By TOM CAMPBELL
News-Markets Editor

New York—Before the Congressional Economic Committee last week at Washington B. F. Fairless, U. S. Steel head, said in brief:

(1) U. S. Steel has sold raw material to other steel firms. These firms make finished steel items and compete with U. S. Steel.

(2) U. S. Steel has lost money on this raw steel sold to nonintegrated makers.

(3) His company was in business to make money.

(4) The corporation either had to (a) stop selling the steel or (b) raise the price.

(5) They decided to raise the price in order not to force the smaller firms out of business.

The outburst over the price of semifinished steel came about because the U. S. Steel Co. did not believe it was important and made no announcement to the public. Newspapers and editorial writers grabbed at the raw steel increase and made it an issue.

It was clear, said Mr. Fairless, that increased steel costs would have to be met with higher prices. He thought a third round of wage increases was not necessary. He promised that when steel costs stop going up his company will consider reducing the price of its products.

Editor's note—For more news on Washington angle of steel price situation see page 156.

Looking To The Future

Industrial Briefs . . .

• CONSOLIDATES—The leasing of manufacturing space at 2300 Linden Ave., Zanesville, Ohio, in which to consolidate all Zanesville operations of the Timken Roller Bearing Co., has been announced. The new quarters will be available shortly after May 1.

• DISTRIBUTOR—Champion Forge Co., Cleveland, has announced the appointment of District Steel & Equipment Co., 4536 District St., Los Angeles, as exclusive distributor in the state of California.

• BORG-WARNER EXPANDS — Manufacturing and shipping facilities of the Norge-Heat Div. of Borg-Warner Corp. were expanded with the acquisition of a plant at Hammond, Ind. Among new products to be made at this plant is a convertible air-conditioning furnace which will allow the use of either coal, gas or oil.

• PURCHASE—Wheelock Mfg. Co., St. Johnsbury, Vt., has been purchased by Chicago Metal Hose Corp. and is being operated as the Wheelock Manufacturing Div. thereby increasing their extensive line of flexible metal hose tubing.

• JOINS RESEARCH STAFF—Leonard P. Rice, formerly a metallurgist with the Bendix Products Div., Bendix Aviation Corp., has been named to the metallurgical research staff of Battelle Institute, Columbus, Ohio.

• SWEDISH CONSTRUCTION — The design and engineering of the reconstruction of the new steelworks at Stora Kopparbergs Bergslags Aktiebolag (Domnarfvets Jernverk) in Sweden has been entrusted to John Miles & Partners of London.

• PRESENTED AWARD — A. J. Langhammer, president, Amplex Div., Chrysler Corp. was given the Stevens Institute Award for outstanding achievement in the development and use of powder metallurgy.

Allocation Proceedings For Steel Announced

Washington

• • • **Procedures to be** followed in determining allocations of steel under the voluntary agreements law were announced this week by the Office of Industry Cooperation. Generally, the Secretary of Commerce, with the advice of a steel consuming industry committee, will submit to the Steel Advisory Committee a program with the following supporting data: number of manufacturers represented; products covered; steel required; comparison of program with the industry's 1936-39 production; proof of essentiality and evidence that program meets purposes of the law.

The program must be approved by the Steel Advisory Committee and and the Director of the OIC Steel Division. The consuming industry must also agree to use the additional steel for the purpose outlined in the agreement.

Commerce Dept. will attempt to obtain agreeemnt among steel producers to accept their proportionate shares of the additional load. Commerce also emphasized that present plans call for the allocation of steel to four industries: freight cars; farm equipment; petroleum equipment; and housing.

Speaks On Improved Process for Hot Dip Tinplate Production

New Orleans

• • • **Automatic feeding** and electrolytic pickling of sheets at the tin stacks and better handling of tinplate are among improvements reported by Tennessee Coal, Iron & R. R. Co. They were described by E. F. Harris of the company's Fairfield sheet and tin mills in a talk prepared for delivery before the American Society of Mechnical Engineers here on Mar. 1. Mr. Harris is assistant to the general superintendent of the sheet and tin mills.

From the white pickler to finished tinplate, there has, until recently been no radical change or improvement during the past 15 years, he said. In 1941 the Fairfield tin mill of Tennessee Coal, Iron & R. R. Co. began searching for a means of improving hot dip tinplate and a means of eliminating the remaining heavy manual labor inherent in its manufacture.

The search, Mr. Harris said, was first for a means of providing a feeder and pickler immediately ahead of and in tandem with the tin machine. In the new process, lifts of sheared plate weighing as much as 10,000 lb are delivered directly from the flying shears to the entry end of the tin stacks. These lifts of plate are pushed onto automatic hydraulic hoists and raised to position for feeding by the vacuum cup feeder.

"The plates are fed two abreast into an electrolytic pickling unit consisting of a rubber lined tank equipped with two conductor roll assemblies; the top roll of steel or carbon is paired with a bottom roll of rubber, with glass *Micarta* finger guides.

"By this automatic feeding and electrolytic pickling of sheets at the tin stacks, we have eliminated the former white pickling operation as a process in making tinplate, Mr. Harris reported. A further advantage is that larger size sheets can now be tinned.

"*After successful* completion of the first task, elimination of white pickling, we then turned to a search for means by which tinplate could be assorted (or inspected), counted, weighed and packaged in a continuous line in tandem with the tin machine and thus avoid the manual handling and tractor handling of the finished product.

New A-Plant for Ohio

Marion, Ohio

• • • **Monsanto Chemical Co.** has chosen a site northeast of Marion, Ohio, for the establishment of a new atomic energy installation as part of the AEC nationwide construction of research programs. The installation will be used for the investigation of basic chemical problems in the field of atomic energy, and will be located at the site of the Scioto Ordnance Works. The AEC will use approximately 1200 acres of a 12,000 acre tract which they have acquired from WAA. Construction cost is estimated at $5 million and the project will take one year to complete.

Forging Plant Bought

Washington

• • • **Wyman-Gordon Co.** has purchased the drop hammer steel forging facilities at Harvey, Ill., which the firm operated for the government during the war. The sale price of $2,671,025.11 cash, WAA said, is approximately 91 pct of cost.

More than $1.1 million will be spent by the new owner in converting and expanding the property for the production of commercial products, largely crankshafts of various sizes.

Steel Extra Increases Since War Show Tremendous Variation

Many Items Extra-less Before War Now Get Their Dose As General Rule

o o o

By D. I. BROWN

Chicago Regional Editor

o o o

Chicago

• • • **Steel prices** cannot be judged on base prices alone. The base reflects but a part of the total and varies widely depending on the specific product and how it is ordered. The rest of the total price is made up of extras. It is impossible to order any popular steel item without paying some kind of an extra.

No one in the industry knows what the total per cent increase of all steel prices has been been except by comparing total billings on all items. Base prices as such are meaningless. Four mills were contacted in an effort to secure median sizes, chemistry and specifications. With the exception of two of the smaller mills, producers did not know what their medians were on any of their products, with the possible exception of carbon bars.

At the moment the AISI is preparing data in an attempt to ascertain just how much of their product is sold in a certain size, chemistry and specification. Preliminary figures have been reached by two large producers but these have to be weighted against the rest of the industry. Because the product mix of the industry is constantly changing, these figures by the time they are published, may also be of little value. There are a few basic facts which can be stated to outline the part extra charges play in steel pricing.

Specifying a size usually calls for an extra. Widths, lengths and thicknesses vary in cost because of the extra. Any quality above merchant bar quality in bars, of commercial quality in sheets, means an assessment. Extras cover quantities, packing, loading, marking, chemistry, check analysis, straightness, resquaring and a host of others.

Woe unto anyone who wants a non-standard analysis or a restricted chemistry. All forms of heat treating bear extra charges, in fact astute purchasing agents pay as much attention to extras as base prices because, the final cost of steel to the buyer depends on how few mistakes he makes in specifying the item to the mill. Mistakes, that is, by forgetting to so specify the item that the mill can't charge the extras.

In an effort to evaluate what part extras are of the final prices, certain items were chosen and priced. These are heavy tonnage popular items and were chosen in mill quantities with no special bundling, marking or fancy specifications. Standard chemistries, sizes and lengths were used so the prices are the lowest possible for the specified items. The prices effective in 1939 are compared to present prices.

The old price on 55/64 in. rounds HR 1020 bars consisted entirely of the base price, $2.15 cwt. Today's price in MBQ is $3.05 cwt so that the size extra amounts to 4.9 pct of this item. Carbon bars of the chemistry and quality just mentioned are used in very ordinary application where high strength is not essential. Hot headed bolts and rivets are often made out of this stock. HR 1020 angles 2 x 2 x ¼ in. formerly carried 6.5 pct of the total price as extra. Today 7.9 pct of the total cost is in the size extra.

HR B113 rods ½ in. in dia. in coils used to cost $2.65 cwt wherein the extras amounted to 19.1 pct. This bessemer grade is used on automatic machine screw parts where high finish and excellent machinability are the prime requisite. Rods of the type stated here are invariably cold drawn so as to produce even better machinability and above all close dimentional tolerance. Now with a $3.70 cwt price on this item, the extras for size and grade amount to 24.3 pct of the total cost.

A 1½ in. OH bar of 1040 SBQ in '39 carried only a 2.3 pct extra. At present this same product carries on 8 pct of total extra charge. Special bar quality carbon bars in the medium carbon grade cited here is the most widely used grade for small and medium sizes of plain carbon steel forgings. Uses vary all over the lot—tubing, crankshafts, axles, bolts, studds and similar items. Very often mills insist that in this chemistry steel must be bought at special requirement quality because of application. In cases where the application, such as cold heading, carburizing or special heat treating requires additional restrictive requirements, the present extra of 50¢ a cwt would be added to the above price. In '39 the SRQ extra was also 50¢ but in those days the customer did not get socked for special bar quality in addition to SRQ.

Carbon plates ASTM7 ½ in. by 72 x 360 in. in '39 were sold on base price only. Such plates are widely used in common every day plate applications, such as tanks, structural work, ordinary pipe requirements, etc. Today this item carries a $1.00 a ton extra so the extra is 1.5 pct of the total cost at present.

Thinner plates such as ¼ by 80 x 540 in. in .22-.30 C .85-1.15 Mn used to cost $2.30 cwt. Now this item costs $3.25 cwt. Here the base price is increased by 40.5 pct over '39 and the extras are up 50 pct. This particular plate chemistry and size is a very popular linepipe application.

Common applications not requiring extra fine surfaces in which cold rolled strip SAE 1010 4 in. wide, soft temper No. 2 finish in base price coil weight is used has not gone up much. Total increase in cost is 25.6 pct and the per cent extra of total has not changed.

Largest price increases in heavy tonnage items appears in alloy steels. In '39 1340 HR 3½ in. rounds cost $3.05 cwt, today the price is $4.45 cwt. In '39 extras were only 11.5 pct of the total price, today they are 39.5 pct of the total. Actually the size and grade extras on this item have increased 229 pct over the '39 identical extras. This particular alloy grade is the cheap-

(*Continued on page* 191)

MACHINE TOOLS

. . . News and Market Activities

$115 Million of Machine Tools Scheduled First Year of ERP

• • • **Easily the best** break for machine tool builders in many a moon is the inclusion of machine tools to the tune of $115 million the first year under the European Recovery Program. While ERP, or the Marshall Plan, which answers to either title depending on whether you're a Republican or a Democrat, is not yet law, it is before Congress in three different versions, all of which stress the rebuilding of European industries.

Present plans are that industrialists in each country covered by ERP will go to their government and prove their need for various machine tool items. Their government in turn will certify these needs. Tools will be purchased by the industrialists through the regular commercial channels. U. S. machine tool builders will be paid in dollars under ERP provisions, which will be charged off against the credits of the country involved.

Much depends upon the ERP administrator, who has not yet been named, but indications are that it will be at least 6 months before any of this business reaches the machine tool industry. First the law must pass, then European governments must make a survey of their needs, manufacturers will have to be certified, then place their orders, etc.

It is rather doubtful if this development could have come at a more propitious moment of the machine tool industry. Producers have been scraping the bottom of the barrel for new firm orders, foreign or domestic, since the recent price increases went into effect, and backlogs have been undergoing a gradual reduction for many months. With ERP business on foreign fronts and JANMAT tagging the tools out of domestic markets, it is quite apparent that the machine tool industry is an industry of destiny indeed.

Sales reports from major segments of the industry indicate that business is extremely quiet in some sectors. Inquiries have fallen off sharply since the price increases,

After Scraping Barrel for New Orders, Builders See Hope Here

o o o

although dealers and sales representatives have been turning on the heat. Some capital equipment producers, including power shovel manufacturers, who are very busy continue to show interest in new machine tools but price resistance is definitely on the upgrade.

Companies, large and small alike, are backing off from the new prices, and from lines where prices were not raised. Sales are being lost on price because buyers are buying on price. Some sales representatives have already discovered that in plants where their lines have been a long-time favorite the lower priced equipment is getting the nod.

JANMAT, according to reports, is still idling along. It is understood that about 60,000 tools have been tagged, with 32,000 more to go. A law to increase the size of this reserve is supposed to be pending, but by the time the law is passed, it is rather doubtful if there will be anything left to tag, according to trade sources.

War Assets Administration is selling some obsolete equipment at auctions, supposedly for scrap, but the usual complaint is heard that buyers are selling the stuff as machine tools instead of consigning it to the cupola. Great pressure has been brought to bear on the scrapping of this equipment, whether it be obsolete, overage or special. The program is reported getting out of hand in some quarters and usable equipment is being scrapped, supposedly, only to end up in the used machinery market.

While plans for the sales refresher course at Cornell University this summer, sponsored by the National Machine Tool Builders' Assn., are being carried out in detail, the domestic market has become something of a problem. Lion's share of buyer interest surrounds the old reliable models, despite the new equipment introduced to the trade at Chicago last summer. One builder has not received a single order for one that he displayed at the show. Whether this is the result of price, or the particular model is hard to say but the bread and butter lines are still the favorite. Deliveries on many lines are down to 2 to 3 weeks, 10 days if the buyer insists, and a week, if the salesman has to get the order away from competition.

New England Outlook Reported Improving

New England small tool manufacturers generally report a pickup in business. One of the optimists, A. H. Starrett, president L. S. Starrett Co., says the outlook for the next few months looks encouraging. The company's backlog continues to be substantial and new orders are coming in at a satisfactory rate, he says.

Electrification Forum To Be Held in Buffalo

The keynote of the 1948 Westinghouse Machine Tool Electrification Forum, to be held in Buffalo, Apr. 22 and 23, will be control. Some of the topics which will be presented or discussed are: "Electronic Lathe Controls," "Application of Instruments to Machine Tools," "A Recent Development in Automatic Lathe Control," "Control Problems in Keller Machine," "Oscillagraphic Performance Analysis of Automatic Tool Sharpener," "Turning Points in the Metal Working Industry," "Electronic Motor Control," "Selecting dc Power Sources for Machine Tools," and "Report on the Machine Tool Industry."

SCRAP

. . . News and Market Activities

Movement Easier At Formula Prices

New York

• • Better weather in most districts was contributing to an easier flow of scrap, and some caution on matters of price. As a lot of scrap was moving in most districts at formula prices, the big news of the week is the price resistance of foundry buyers to present cast scrap quotations. This resistance was more evident in the middle west and south than in the east.

On openhearth grades there was a "wait and see" attitude on the part of most dealers and brokers. Railroad specialties showed themselves to be definitely stabilized, and were soft in some districts.

The weakness that developed in No. 2 steel scrap in the Chicago district last week did not immediately spread into other districts. Some sources expected it to do so soon, others scoffed at the proposition.

The shipment of scrap to Canada from the Buffalo area, which has often strengthened the price of No. 1 there in recent weeks has halted. The No. 1 price there is eased as a result. In Philadelphia, reduction of $1 on No. 1 steel drops that market to below formula levels. It also reduces the IRON AGE scrap composite price to $39.75, down 25¢ from last week, and hitting a new low for the year.

There is some feeling that the cleaning up of old orders next week may push the market into another period of serious price testing. Many 30 day orders are either due to be completed at that time, or are subject to cancellation.

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PITTSBURGH—Some brokers are bullish—some bearish; in one office there are examples of both schools of thought. Dealers aren't deluging brokers with car numbers. The whole attitude is one of wait and see. Weakness in Chicago on poorer grades did not immediately transmit itself here largely, it is thought, because local supplies are still hardly worth talking about. Mills have become more particular about some of the so-called low phos grades although genuine low phos is steady. Pittsburgh, as a minus scrap district, suffers from the formula setup, particularly because some producers in neighboring districts are reported to have increased the springboards they will pay.

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CHICAGO—New business was almost at a standstill last week. Going prices are somewhat more diverse than they have been due to certain mills staying out of the market and others jumping in and out for small tonnages. Shipments have been heavy against the large orders last placed at formula levels. Carnegie has been laying scrap on the ground for over two weeks. Brokers and dealers believe that by next week the situation will clarify as all 30-day-old orders will be cleaned up or subject to cancellation. Railroad specialties continue erratic. Lists closing last week show some items up a dollar or two and other items down as much as $2.50. Railroad heavy melting and rerolling rails are definitely stabilized at the mills' last price across the board.

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PHILADELPHIA — Heavy melting scrap prices were $1 lower last week on news of the sale of No. 2 melting grades at $38.00. While admitting softness in the market at the moment some sources expect to see a strengthening in the next few weeks. How this can be expected with the increased yard operations to be expected in milder weather is difficult to foresee. One mill here is buying unprepared scrap from a Philadelphia shipyard and having it cut into charging box size by a local yard. This is expected to diminish the mill's need for large tonnages of No. 1 melting which are not available in this market. On pipe foundry stopped buying cast for a time, but has now returned to the market. Cast supply is reported to be easier, but prices are firm. Low phos prices are down $1.00. Railroad specialties and malleable are firm at previous levels.

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BUFFALO—Slightly easier tendencies in premium grades of scrap last week were attributed to price shading on one of the rail lists. Railroad specialties and No. 1 heavy melting were reduced $1 per ton and $2 was skimmed off the low phos price. A dealer's offer to pay $65 delivered Erie, Pa., for mixed yard cast, equivalent to $62 Buffalo, offset price resistance of local foundries. The Canadian business wound up with a bang as about 20 carloads of No. 2 bundles were bounced back across the border for failure to meet specifications. Steel mills here were even more touchy about quality.

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NEW YORK—Scrap continues to move freely, and demand is strong. Brokers expect the supply of scrap to improve still further in coming weeks. Prices of steelmaking grades remain at their previous levels, and cast grades are strong at the levels quoted last week.

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BIRMINGHAM—Scrap is moving freely here at formula prices. Consumers of cast iron are beginning to show resistance, however, to the prices being asked. Substantial tonnages of openhearth grades are being shipped out of this area to other consuming districts.

BOSTON—Cast scrap is coming out more freely but prices are holding. Turnings are also active; other materials modestly so, but additional snow here is still causing trouble.

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DETROIT—Following the reopening of industrial plants here, scrap is moving freely at formula price levels. Substantial buying by one large user has thus far offset any tendency toward weakness in openhearth grades. Cast iron continues to show strength in the absence of adequate supplies of pig iron.

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CLEVELAND—There has been no change in the market here or in the Valley. Scrap has tightened up a little and there is no resistance on the part of consumers to formula prices. Distribution of available material is not good, and consumers are willing to take all they can get in openhearth and blast furnace grades at the formula. Present indications are that this demand may last for 30 to 45 days.

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CINCINNATI—Foundry grades are beginning to show signs of weakness. Openhearth and blast furnace grades are moving better at formula prices and mills are willing to take all they can get. Weakness in foundry grades is beginning to show up in softer prices. Foundries want to buy for less and are able to do so.

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Extras More Important

(*Continued from page* 187)

est alloy steel on the list. It is widely used for shafting, some types of alloy bolts, in many cases gears where the requirement is not too difficult.

OH, HR annealed and machine straightened 1¾ in. Rds. in 4140 used to cost $4.35 cwt, today $5.95 cwt and extras are 38 pct and 44.5 pct, respectively, of the total price. EF ⅞ in. Rds. 4620 bearing quality machine straightened, P & O in '39 cost $4.60 cwt, today $7.30 cwt and per cent extra of total price is 41.5 pct and 54.8 pct, respectively.

HR P & O sheets commercial quality used for ordinary shallow draw and bending is most often ordered .15 max C 36 x 96 in. by 18 gage and used to cost $2.80 cwt, today $3.85 cwt. The extras on this product are up only 18.5 pct over '39 with but a total price increase of 37.5 pct. CR mill run sheets .15 max C commercial quality 36 x 96 in. by 20 gage used to cost $3.20 cwt. Today the f.o.b. mill price is $3.80 cwt. The base price is up by 16.4 pct whereas extras have increased 66.6 pct on this item.

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$40.00 to $40.50
RR. hvy. melting	41.00 to 41.50
No. 2 hvy. melting	40.00 to 40.50
RR. scrap rails	54.00 to 55.00
Rails 2 ft and under	59.00 to 60.00
No. 1 comp'd bundles	40.00 to 40.50
Hand bdld. new shts	40.00 to 40.50
Hvy. axle turn.	41.50 to 42.00
Hvy. steel forge turn	41.50 to 42.00
Mach. shop turn	35.00 to 35.50
Shoveling turn.	38.00 to 38.50
Mixed bor. and turn	35.00 to 35.50
Cast iron borings	38.00 to 38.50
No. 1 cupola cast.	60.00 to 62.00
Hvy. breakable cast	51.00 to 52.00
Malleable	77.00 to 79.00
RR. knuck. and coup.	54.00 to 55.00
RR. coil springs	54.00 to 55.00
RR. leaf springs	54.00 to 55.00
Rolled steel wheels	54.00 to 55.00
Low phos.	47.00 to 48.00

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$38.50 to $39.50
No. 2 hvy. melting	37.00 to 37.50
No. 1 bndules	38.50 to 39.50
No. 2 dealers' bundles	37.00 to 37.50
Bundled mach. shop turn.	37.00 to 37.50
Galv. bundles	35.00 to 35.50
Mach. shop turn.	33.50 to 34.50
Short shov. turn.	35.00 to 36.50
Cast iron borings	34.50 to 35.50
Mix. borings & turn.	33.50 to 34.50
Low phos. hvy. forge	44.00 to 48.00
Low phos. plates	42.50 to 46.00
No. 1 RR. hvy. melt.	41.25 to 41.75
Rerolling rails	49.50 to 50.00
Miscellaneous rails	48.00 to 50.00
Angles & splice bars	49.00 to 50.00
Locomotive tires, cut	50.00 to 52.00
Cut bolster & side frames	47.00 to 48.00
Standard stl. car axles	54.00 to 57.00
No. 3 steel wheels	46.00 to 50.00
Couplers & knuckles	47.00 to 49.00
Rails, 2 ft and under	54.00 to 56.00
Malleable	70.00 to 72.00
No. 1 mach. cast.	68.00 to 70.00
No. 1 agricul. cast.	63.00 to 64.00
Heavy breakable cast.	50.00 to 52.00
RR. grate bars	56.00 to 58.00
Cast iron brake shoes	55.00 to 57.00
Cast iron carwheels	57.00 to 58.00

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$38.50 to $39.50
No. 2 hvy. melting	38.50 to 39.50
No. 1 bundles	38.50 to 39.50
No. 2 bundles	38.50 to 39.50
Mach. shop turn.	33.00 to 33.50
Shoveling turn.	35.00 to 35.50
Cast iron borings	32.50 to 33.00
Mixed bor. & turn.	32.50 to 33.00
Low phos., plate	46.00 to 48.00
No. 1 cupola cast	63.00 to 64.00
Hvy. breakable cast.	53.00 to 54.00
Rails 18 in. & under	59.00 to 60.00
Rails random length	51.00 to 52.00
Drop broken	66.00 to 68.00

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars:

No. 1 hvy. melting	$31.65 to $31.90
No. 2 hvy. melting	31.65 to 31.90
Nos. 1 and 2 bundles	31.65 to 31.90
Busheling	31.65 to 31.90
Shoveling turn.	.... 28.90
Machine shop trun.	.... 26.90
Mixed bor. & turn.	.... 26.90
Cl'n cast. chem. bor.	35.00 to 36.00
No. 1 machinery cast	60.00 to 65.00
No. 2 machinery cast	60.00 to 65.00
Heavy breakable cast	60.00 to 65.00
Stove plate	45.00 to 50.00

DETROIT

Per gross ton, brokers' buying prices f.o.b. cars:

No. 1 hvy. melting	.... $35.50
No. 2 hvy. melting	.... 35.50
No. 1 bundles	.... 35.50
New busheling	.... 35.50
Flashings	.... 35.50
Mach. shop turn.	$29.00 to 29.50
Shoveling turn.	30.00 to 30.50
Cast iron borings	30.00 to 30.50
Mixed bor. & turn.	28.50 to 29.00
Low phos. plate	39.50 to 40.50
No. 1 cupola cast.	60.00 to 62.00
Heavy breakable cast.	52.00 to 55.00
Stove plate	52.00 to 55.00
Automotive cast.	60.00 to 62.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$39.50 to $40.50
No. 2 hvy. melting	37.00 to 38.00
No. 1 bundles	37.00 to 38.00
No. 2 bundles	37.00 to 38.00
Mach. shop turn.	33.00 to 34.00
Shoveling turn.	33.00 to 34.00
Mixed bor. & turn.	33.00 to 34.00
Clean cast chemical bor.	40.00 to 42.00
No. 1 machinery cast	65.00 to 66.00
No. 1 mixed yard cast	63.00 to 65.00
Hvy. breakable cast.	59.00 to 60.00
Clean auto cast.	63.00 to 65.00
Hvy. axle forge turn.	39.50 to 40.50
Low phos. plate	44.50 to 46.50
Low phos. punchings	44.50 to 46.50
Low phos. bundles	43.00 to 44.00
RR. steel wheels	51.00 to 52.00
RR. coil springs	51.00 to 52.00
RR. malleable	72.00 to 75.00

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy. melting	$41.00 to $42.00
No. 2 hvy. melting	37.50 to 38.50
Bundled sheets	37.50 to 38.50
Mach. shop turn.	33.00 to 33.50
Locomotive tires, uncut	46.00 to 48.00
Mis. std. sec. rails	48.00 to 50.00
Rerolling rails	50.00 to 51.00
Steel angle bars	57.00 to 58.00
Rails 3 ft and under	54.00 to 56.00
RR. steel springs	48.00 to 50.00
Steel car axles	48.00 to 50.00
Grate bars	56.00 to 57.00
Brake shoes	54.00 to 55.00
Malleable	71.00 to 72.00
Cast iron car wheels	54.00 to 55.00
No. 1 machinery cast	64.00 to 65.00
Hvy. breakable cast	52.00 to 53.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$37.50 to $38.50
No. 2 hvy. melting	37.50 to 38.50
No. 2 bundles	37.50 to 38.50
No. 1 busheling	37.50 to 38.50
Long turnings	25.00 to 26.00
Shoveling turnings	27.00 to 28.00
Cast iron borings	26.00 to 27.00
Bar crops and plate	42.50 to 43.50
Structural and plate	42.50 to 43.50
No. 1 cupola cast.	60.00 to 65.00
Stove plate	55.00 to 58.00
No. 1 RR. hvy. melt.	37.50 to 38.50
Steel axles	38.00 to 39.00
Scrap rails	44.00 to 45.00
Rerolling rails	52.00 to 54.00
Angles & splice bars	47.50 to 50.00
Rails 3 ft & under	52.00 to 56.00
Cast iron carwheels	48.00 to 50.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$40.00 to $40.50
No. 2 hvy. melting	40.00 to 40.50
Mach. shop turn.	35.00 to 35.50
Short shov. turn.	37.00 to 37.50
Cast iron borings	36.00 to 36.50
Low phos.	45.00 to 45.50

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	.... $34.50
No. 2 hvy. melting	.... 34.50
No. 2 bundles	.... 34.50
Comp. galv. bundles	$30.50 to 31.50
Mach. shop turn.	$29.00 to 30.00
Mixed bor. & turn.	29.00 to 30.00
Shoveling turn.	31.00 to 32.00
No. 1 cupola cast.	60.00 to 61.00
Clean auto cast.	60.00 to 61.00
Hvy. breakable cast.	55.00 to 56.00
Charging box cast.	55.00 to 56.00
Stove plate	51.00 to 52.00
Unstrp. motor blks.	50.00 to 51.00
Cl'n chem. cast bor.	34.50 to 35.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$43.00 to $43.50
No. 2 hvy. melting	.... 39.50
No. 1 bundles	.... 39.50
No. 2 bundles	.... 39.50
No. 1 busheling	.... 39.50
Mach. shop turn.	34.75 to 35.25
Shoveling turn.	36.75 to 37.25
Cast iron borings	.... 35.75
Mixed bor. & turn.	.... 34.75
Mixed cupola cast.	57.00 to 58.00
Charging box cast.	52.00 to 53.00
Stove plate	56.00 to 57.00
Clean auto cast.	58.00 to 60.00
RR. malleable	70.00 to 75.00
Small indl. malleable	47.00 to 49.00
Low phos. plate	44.75 to 48.00
Scrap rails	58.00 to 59.00
Rails 3 ft & under	60.00 to 61.00
RR. steel wheels	51.00 to 52.00
Cast iron carwheels	51.00 to 52.00
RR. coil & leaf spgs.	51.00 to 52.00
RR. knuckles & coup.	51.00 to 52.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$39.50 to $40.00
No. 2 hvy. melting	39.50 to 40.00
No. 1 bundles	39.50 to 40.00
No. 1 busheling	39.50 to 40.00
Drop forge flashings	39.50 to 40.00
Mach. shop turn.	34.50 to 35.00
Shoveling turn.	35.50 to 36.00
Steel axle turn.	39.50 to 40.00
Cast iron borings	35.50 to 36.00
Mixed bor. & turn.	35.50 to 36.00
Low phos.	44.50 to 45.00
No. 1 machinery cast.	65.00 to 70.00
Malleable	75.00 to 80.00
RR. cast.	70.00 to 75.00
Railroad grate bars	60.00 to 62.00
Stove plate	60.00 to 62.00
RR. hvy. melting	40.00 to 40.50
Rails 3 ft & under	60.00 to 61.00
Rails 18 in. & under	61.00 to 62.00

SAN FRANCISCO

Per gross ton f.o.b. shipping point:

No. 1 hvy. melting	.... $25.00
No. 2 hvy. melting	.... 25.00
No. 2 bales	.... 25.00

Per gross ton delivered to consumer:

No. 3 bales	.... $19.50
Mach. shop turn.	.... 16.00
Elec. furn. 1 ft under	$32.00 to 34.00
No. 1 cupola cast.	34.00 to 37.00
RR. hvy. melting	.... 26.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	.... $25.50
No. 2 hvy. melting	.... 25.50
No. 1 bales	.... 25.50
No. 2 bales	.... 25.50
No. 3 bales	.... 19.50
Mach. shop turn.	.... 17.50
No. 1 cupola cast.	$40.00 to 43.00
RR. hvy. melting	.... 26.50

SEATTLE

Per gross ton delivered to consumer:

No. 1 & No. 2 hvy. melt.	.... $26.00
Elec. furn. 1 ft and under	.... 30.00
No. 1 cupola cast.	40.00 to 42.00
RR. hvy. melting	.... 30.00

HAMILTON, ONT.

Per gross ton delivered to consumer: Cast grades f.o.b. shipping point.

Heavy melting	$22.00*
No. 1 bundles	22.00*
No. 2 bundles	21.50*
Mechanical bundles	20.00*
Mixed steel scrap	19.00*
Mixed borings and turnings	17.00*
Rails, remelting	23.00*
Rails, rerolling	26.00*
Bushelings	17.00*
Bushelings, new fact, prep'd	21.00*
Bushelings, new fact, unprep'd	16.00*
Short steel turnings	17.00*
No. 1 cast	$42.00 to 43.00
No. 2 cast	35.00 to 37.00

*Ceiling Price.

Comparison of Prices . .

Advances over past week in **Heavy Type**, declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-Rolled Steel: (cents per pound)	Mar. 9, 1948	Mar. 2, 1948	Feb. 10, 1948	Mar. 11, 1947
Hot-rolled sheets	2.80	2.80	2.80	2.50
Cold-rolled sheets	3.55	3.55	3.55	3.20
Galvanized sheets (10 ga.)	3.95	3.95	3.95	3.55
Hot-rolled strip	2.80	2.80	2.80	2.50
Cold-rolled strip	3.55	3.55	3.55	3.20
Plates	2.95	2.95	2.95	2.65
Plates wrought iron	7.25	7.25	7.25	5.95
Stain's c-r strip (No. 302)	30.50	30.50	30.50	30.50
Tin and Terneplate: (dollars per base box)				
Tinplate (1.50 lb) cokes.	$6.80	$6.80	$6.80	$5.75
Tinplate, electro (0.50 lb)	6.00	6.00	6.00	5.05
Special coated mfg. ternes	5.90	5.90	5.90	4.90
Bars and Shapes: (cents per pound)				
Merchant bars	2.90	2.90	2.90	2.60
Cold-finished bars	3.55	3.55	3.55	3.20
Alloy bars	3.30	3.30	3.30	3.05
Structural shapes	2.80	2.80	2.80	2.50
Stainless bars (No. 302).	26.00	26.00	26.00	26.00
Wrought iron bars	8.65	8.65	8.65	6.15
Wire: (cents per pound)				
Bright wire	3.55	3.55	3.55	3.30
Rails: (dollars per 100 lb)				
Heavy rails	$2.75	$2.75	$2.75	$2.50
Light rails	3.10	3.10	3.10	2.85
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$45.00†	$45.00†	$45.00	$42.00
Slabs, rerolling	45.00†	45.00†	45.00	42.00
Forging billets	54.00†	54.00†	55.00	50.00
Alloy blooms, billets, slabs	66.00	66.00	66.00	61.00
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.80	2.80	2.80	2.55
Skelp	2.90	2.90	2.60	2.35

†Net ton

Pig Iron: (per gross ton)	Mar. 9, 1948	Mar. 2, 1948	Feb. 10, 1948	Mar. 11, 1947
No. 2, foundry, Phila.	$44.61	$44.61	$44.61	$36.51
No. 2, Valley furnace	39.50	39.50	39.50	33.50
No. 2, Southern Cin'ti	43.28	43.28	43.28	34.75
No. 2, Birmingham	37.38	37.38	37.38	29.88
No. 2, foundry, Chicago†	39.00	39.00	39.00	33.00
Basic del'd Philadelphia	44.11	44.11	44.11	36.92
Basic, Valley furnace	39.00	39.00	39.00	33.00
Malleable, Chicago†	39.50	39.50	39.50	33.50
Malleable, Valley	39.50	39.50	39.50	33.50
Charcoal, Chicago	62.46	62.46	62.46	45.99
Ferromanganese‡	145.00	145.00	145.00	135.00

†The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡For carlots at seaboard.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$40.25	$40.25	$40.50	$39.50
Heavy melt'g steel, Phila.	*40.00*	41.00	41.50	39.50
Heavy melt'g steel, Ch'go	**39.00**	38.75	39.50	37.25
No. 1, hy. comp. sheet, Det.	35.50	35.50	35.50	35.00
Low phos. Young'n	45.25	45.25	45.25	43.50
No. 1, cast, Pittsburgh	61.00	61.00	58.50	41.50
No. 1, cast, Philadelphia	65.50	65.50	64.00	49.00
No. 1, cast, Chicago	**69.00**	66.50	64.50	44.25
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$12.50	$12.50	$12.50	$9.00
Foundry coke, prompt	14.00	14.00	14.00	10.25
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro, Conn.	21.50	21.50	21.50	21.50
Copper, Lake Conn.	21.625	21.625	21.625	21.625
Tin, Grade A, New York	94.00	94.00	94.00	70.00
Zinc, East St. Louis	12.00	12.00	12.00	10.50
Lead, St. Louis	14.80	14.80	14.80	14.80
Aluminum, virgin	15.00	15.00	15.00	15.00
Nickel, electrolytic	36.56	36.56	36.56	37.67
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	33.00	33.00	33.00	28.25

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942, and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite price for the current quarter is an estimate based on finished steel shipments for the previous quarter. This figure will be revised when shipments for this quarter are compiled.

	FINISHED STEEL (Base Price)	PIG IRON	SCRAP STEEL
Mar. 9, 1948	3.23940¢ per lb.	$40.37 per gross ton	*$39.75* per gross ton
One week ago	3.23940¢ per lb.	$40.37 per gross ton	$40.00 per gross ton
One month ago	3.19411¢* per lb.	$40.17 per gross ton	$40.50 per gross ton
One year ago	2.86354¢ per lb.	$33.15 per gross ton	$38.75 per gross ton

*Revised

	HIGH	LOW	HIGH	LOW	HIGH	LOW
1948	3.23940¢ Feb. 17	3.19411¢ Jan. 6	$40.37 Feb. 17	$39.58 Jan. 6	$41.83 Jan. 29	$39.75 Mar. 9
1947	3.19411¢ Oct. 7	2.87118¢ Jan. 7	37.98 Dec. 30	30.14 Jan. 7	42.58 Oct. 28	29.50 May 20
1946	2.83599¢ Dec. 31	2.54490¢ Jan. 1	30.14 Dec. 10	25.37 Jan. 1	31.17 Dec. 24	19.17 Jan. 1
1945	2.44104¢ Oct. 2	2.38444¢ Jan. 2	25.37 Oct. 23	23.61 Jan. 2	19.17 Jan. 2	18.92 May 22
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5	$23.61	$23.61	19.17 Jan. 11	15.76 Oct. 24
1943	2.29176¢	2.29176¢	23.61	23.61	$19.17	$19.17
1942	2.28249¢	2.28249¢	23.61	23.61	19.17	19.17
1941	2.43078¢	2.43078¢	$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	$19.17 Apr. 10
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35367¢ Jan. 3	2.26689¢ May 16	22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4	23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 9
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10	19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 8
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8	18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2	17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25
1933	1.95578¢ Oct. 3	1.75836¢ May 2	16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3
1932	1.89196¢ July 5	1.83901¢ Mar. 1	14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29	15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29
1930	2.25488¢ Jan. 7	1.97319¢ Dec. 9	18.21 Jan. 7	15.90 Dec. 16	15.00 Feb. 18	11.25 Dec. 9
1929	2.31773¢ May 28	2.26498¢ Oct. 29	18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 8

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing major portion of finished steel shipments. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

NONFERROUS METALS

Copper

• • • **Consumers' pressure** for delivery of copper continues unabated. Wire mill demand is heavy. Brass mill demand is reported to be improving. Producers expect to open the April books early this week. Export copper is reported to have been sold at a high price of 22.00¢ f.a.s. New York although major producers are still selling at a price of 21.50¢. According to the weighted average, export sales volume is still largely at the lower level. Reports of sales of copper to domestic consumers at prices higher than the 21.50¢ figure are attributed only to small tonnages for nearby delivery.

A meeting of the National Minerals Advisory Committee was held at the time of the AIME meeting last month. According to reports from those in attendance, a large part of the meeting was taken up with the question of subsidies. A report, to be submitted to the full committee membership for approval, containing views of members on both sides of the subsidy question before its presentation to Secretary Krug. Pending the completion of the report, meetings of individual commodity committees are not expected.

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Lead

• • • **Demand for lead** still exceeds supply despite the fact that consumption by battery makers is well below recent levels. Other consuming fields, such as the tetraethyl, paint and cable producers, could expand their production volume if additional lead were obtainable. There is an indication that battery makers have overproduced their present market and their requirements may be expected to be lower in the future. One battery maker is advertising price cuts of $3 to $4 per unit. During the past year the industry produced some 130 million units, said to be the equivalent of the number of cars on the road. Despite the overall shortage of lead, producers see no immediate prospect of any price increase, although it is conceded that this picture could change at any time. The Monterrey refinery of the American Smelting & Refining Co. is on strike but the company's smelters in Mexico are still operating. The company expects to be able to ship Mexican concentrates to its U.S. refineries so as to minimize any interruption in lead production.

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Tin

• • • **Production of tin** at the government smelter in February was reported by the Dept. of Commerce at an even 2800 long tons, a drop of 372 tons below January production. The drop in production at the smelter is not critical as it is largely accounted for by the shorter month of February. However, smelter operation during February was based on the use of lower grade ores. February production is in line with official expectations of a 30,000 to 35,000 ton year, well below the peak years of 1945 and 1946 when production totaled 40,591 and 43,468 tons, respectively.

The price of tin is apparently fairly stable at 94¢, but independent action by Great Britain in raising buying and selling prices under pressure for a higher price from Malayan producers could serve to raise the domestic market price. Under the Bolivian-United States contract, the price to be paid for Bolivian concentrates for fine tin content was set at 4¢ per lb below the New York market price. However, the contract protects the Bolivians against the possibility of a New York price held below the world market price.

The government is subsidizing the operations of the Longhorn smelter at Texas City, Texas. In the opinion of responsible officials it will not be possible to operate the smelter competitive with Far Eastern producers now or in the future without benefit of subsidy or tariff protection. This opinion is based on the prevailing higher labor costs in this country and the fact that operation is based on the use of low grade Bolivian ores.

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Zinc

• • • **It is an anomaly** that consumers, hard pressed by the shortage of all grades of zinc, are required to buy zinc from the Office of Metals Reserve while another agency of the government is buying zinc for the strategic stockpile which is directly responsible for the tightness in the zinc supply. However the government is buying only High Grade for the stockpile and the largest demand from consumers is for Prime Western. Other grades in short supply include Special High Grade and regular High Grade. The big question in the trade is how long the government can be expected to buy several thousand tons of zinc per month, as this is the factor that is converting what would be a surplus to a shortage. There is no indication of any price change in immediate prospect.

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Ingot Market Inactive

New York

• • • **There have been** no changes in brass and bronze ingot prices. The wide spread quoted in some grades continues unchanged. The market is quiet as consumers are apparently anticipating a further decline in prices and are working down their inventories. The aluminum ingot market is stronger, and the larger volume of transactions is reported to be on the high side of current quotations. Prices on the low side quotations.

Nonferrous Metals Prices

Cents per pound

	Mar. 3	Mar. 4	Mar. 5	Mar. 6	Mar.8	Mar. 9
Copper, electro, Conn.	21.50	21.50	21.50	21.50	21.50	21.50
Copper, Lake, Conn.	21.625	21.625	21.625	21.625	21.625	21.625
Tin, Straits, New York	94.00	94.00	94.00	94.00	94.00	94.00
Zinc, East St. Louis	12.00	12.00	12.00	12.00	12.00	12.00
Lead, St. Louis	14.80	14.80	14.80	14.80	14.80	14.80

Primary Metals

(Cents per lb. unless otherwise noted)

Aluminum, 99+%, f.o.b. shipping point, freight allowed	15.00
Aluminum pig, f.o.b. shipping point	14.00
Antimony, American Laredo Tex.	33.00
Beryllium copper, 3.75-4.25% Be dollars per lb contained Be	20.50
Beryllium aluminum 5% Be, dollars per lb contained Be	40.00
Cadmium, del'd	$1.75
Cobalt, 97-99% (per lb)	$1.65 to $1.72
Copper electro, Conn. Valley	21.50
Copper, lake, Conn. Valley	21.625
Gold, U. S. Treas., dollars per oz.	35.00
Iridium, 99.8%, dollars per troy oz.	2.25
Iridium, dollars per troy oz.	$95 to $105
Lead, St. Louis	14.80
Lead, New York	15.00
Magnesium, 99.8+%, f.o.b. Freeport, Tex.	20.50
Magnesium, sticks, carlots	34.50
Mercury, dollars per 16-lb flask, f.o.b. New York	$77 to $79
Nickel, electro, f.o.b. New York	36.56¢
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$72 to $75
Silver, New York, cents per oz.	74.625
Tin, Grade A, New York	94.00
Zinc, East St. Louis	12.00
Zinc, New York	12.61
Zirconium copper, 6 pct Zr, per lb contained Zr	$8.75

Remelted Metals

Brass Ingot

(Cents per lb, in carloads)

85-5-5-5 ingot	
No. 115	18.50-19.25
No. 120	18.00-18.75
No. 123	17.50-18.25
88-10-10 ingot	
No. 305	24.25
No. 315	21.75
80-10-2 ingot	
No. 210	30.00
No. 215	28.00
No. 245	21.25-22.75
Yellow ingot	
No. 405	14.50-16.00
Manganese bronze	
No. 421	18.00

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys:	
0.30 copper, max.	17.50-17.75
0.60 copper, max.	17.25-17.50
Piston alloys (No. 122 type)	16.50-16.75
No. 12 alum. (No. 2 grade)	16.25-16.75
108 alloy	16.25-16.75
195 alloy	16.50-16.75
AXS-679	16.50-17.00
Steel deoxidizing aluminum, notch-bar, granulated or shot	
Grade 1—95 pct-95½ pct	16.50-17.00
Grade 2—92 pct-95 pct	16.00-16.50
Grade 3—90 pct-92 pct	15.75-16.00
Grade 4—85 pct-90 pct	15.25-15.50

Electroplating Supplies

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	37⅝
Electrodeposited	32¾
Rolled, oval, straight, delivered	33.09
Brass, 80-20, frt. allowed	
Cast, oval, 15 in. or longer	33⅜
Zinc, cast, 99.99	20.50
Nickel 99 pct plus, frt. allowed	
Cast	51
Rolled, depolarized	52
Silver 999 fine	
Rolled, 1000 oz lots per troy oz.	67¼

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	43.00
Copper sulfate, 99.5, crystals, bbls.	11.50
Nickel salts, single, 425 lb bbls. frt. allowed	14.50
Silver cyanide, 100 oz. lots, per oz.	54.00
Sodium cyanide, 96 pct domestic, 100 lb drums	15.00
Zinc cyanide, 100 lb drums	34.00
Zinc sulfate, 89 pct, granules, bbls, frt. allowed	7.75

Mill Products

Aluminum

(Base prices, cents per pound, base 30,000 lb., f.o.b. shipping point, freight allowed.)

Flat Sheet: 0.188 in., 2S, 3S, 24¢; 4S, 61S-O, 25.8¢; 52S, 27.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢. **0.081 in.;** 2S, 3S, 25¢; 4S, 61S-O, 27.1¢; 52S, 29¢; 24S-O, 24S-OAL, 27.7¢; 75S-O, 75S-OAL, 34.3¢. **0.032 in.;** 2S, 3S, 26.4¢; 4S, 61S-O, 30.1¢; 52S, 32.6¢; 24S-O, 24S-OAL, 34.2¢; 75S-O, 75S-OAL, 43.1¢.

Plate: ¼ in. and heavier; 2S, 3S, 21.2¢; 4S-F, 23.2¢; 52S, 24.2¢; 61S-O, 23.8¢; 24S-F,24S-FAL, 24.2¢; 75S, 75S-AL, 30.5¢.

Extruded Solid Shapes: Shape factors **1 to 4;** 31¢ to 59¢; **11 to 13,** 31.9¢ to 69c; **23 to 25,** 33.4c to 90¢; **35 to 37,** 40.8¢ to $1.25; **47 to 49,** 58.7¢ to $1.84.

Extruded Round Rod, Square, Hex, Octagonal Bar: ¼ in. and over, 27¢ to 38¢; ½ to ¾ in., 28¢ to 40.5¢; ⅜ to ½ in., 29c to 43c; ¼ to ⅜ in., 30¢ to 46.5¢; 7/32 to 5/32 in., 32.5¢ to 53.5¢; 9/64 to 3/32 in., 35.5¢ to 62¢.

Rolled Rod: 1.064 to 4.5 in., 2S, 3S, 30¢ to 26.5¢; Cold-finished rod, 0.375 to 3.5 in., 2S, 3S, 32¢ to 28¢.

Screw Machine Stock: Drawn, 1/16 to 1/8 in., 11S-T3, 34¢ to 45¢; cold-finished, ⅜ to 1½ in., 11S-T3, 33¢ to 31¢; rolled, 1⅜ to 3 in., 11S-T3, 31¢ to 28.5¢.

Drawn Wire: coiled, 0.051 to 0.374 in.; 2S, 33¢ to 24¢ 52S, 40.5c to 29c; 56S, 42.5¢ to 34.5¢; 17S-T4, 46¢ to 31¢; 61S-T4, 41c to 30.5c; 75S-T6, 66¢ to 46¢.

Magnesium

(Cents per lb, f.o.b. mill, freight allowed. Base quantity 30,000 lb.)

Sheet and Plate: Ma. FSa. ¼ in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58c-60c; 10, 59c-61c; 12, 63-65c; 14, 69c-74c; 16, 76c-81c; 18, 84c-89c 20, 96c-$1.01; 22, $1.22-$1.31; 24, $1.62-$1.75. Specification grade higher.

Round Rod: M, diam., in., ¼ to ⅝, 47¢; ½ to ¾, 45¢; 1¼ to 2½, 43.5¢; 3½ to 5, 42.5¢. Other alloys higher.

Square, Hexagonal Bar: M, size across flats, in., ¼ to ⅜, 52.5¢; ½ to ¾, 47.5¢; 1¼ to 2½, 45¢; 3½ to 5, 44¢. Other alloys higher.

Solid Shapes, Rectangles: M, form factors, 1 to 4, 46¢; 11 to 13, 49¢; 20 to 22, 51.5¢; 29 to 31, 59.5¢; 38 to 40, 75.5¢; 47 to 49, 98¢. Other alloys higher.

Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057, ¼ to 7/16, $1.21; 5/16 to ⅜, $1.12; ⅜ to 7/16, 97¢; 0.058 to 0.064, 7/16 to ½, 89¢; ½ to ⅝, 81¢; 0.065 to 0.082, ⅝ to ¾, 76¢; ¾ to 1, 72¢; 0.083 to 0.108, 1 to 2, 68¢; 0.165 to 0.219, 2 to 3, 59¢; 3 to 4, 57¢. Other alloys higher.

Nickel and Monel

(Cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	54	43
No. 35 sheets		41
Strip, cold-rolled	66	44
Rod		
Hot-rolled	50	39
Cold-drawn	55	44
Angles, hot-rolled	50	39
Plates	52	41
Seamless tubes	83	71
Shot and blocks		31

Copper, Brass, Bronze

(Cents per pound, freight prepaid on 200 lb.)

	Extruded Shapes	Rods	Sheets
Copper	33.53	....	33.68
Copper, hot-rolled	....	30.03	....
Copper, drawn	..	31.03	....
Low brass	34.36*	31.39	31.70
Yellow brass	32.92*	29.85	30.16
Red brass	34.89*	31.92	32.23
Naval brass	30.28	29.03	34.97
Leaded brass	28.64	24.69	....
Commercial bronze	35.68*	32.96	33.27
Manganese bronze	33.87	32.37	38.47
Phosphor bronze, 5 pct	53.95*	52.95	52.70
Muntz metal	29.80	28.55	32.99
Everdur, Herculoy, Olympic, etc.	37.24	37.50	38.56
Nickel silver, 10 pct.	41.80	42.68	40.54
5 pct	....	....	38.98
Architectrual bronze	28.61	....	....

*Seamless tubing.

Scrap Metals

Brass Mill Scrap

(Cents per pound; add 1¢ per lb for shipments of 15,000 lb or more.)

	Heavy	Turnings
Copper	19⅛	18⅜
Yellow brass	15⅝	14¾
Red brass	17½	16¾
Commercial bronze	17⅝	16⅞
Manganese bronze	15¼	14⅜
Leaded brass rod ends	15¾	....

Custom Smelters' Scrap

(Cents per pound, carload lots, delivered to refinery.)

No. 1 copper, wire	18.00
No. 2 copper, wire	17.00
Light copper	16.00
Refining brass	15.50*

*Dry copper content.

Ingot Makers' Scrap

(Cents per pound, carload lots, delivered to producer.)

No. 1 copper, wire	17.00
No. 2 copper wire	16.00
Light copper	15.00
No. 1 composition	14.00
No. 1 comp. turnings	37.75
Low brass	11.50
Brass pipe	11.00
Radiators	11.00
Heavy yellow brass	10.00
Aluminum	
Mixed old cast	9.75
Mixed old clips	9.75
Mixed turnings	9.00
Pots & pans	10.00
Low copper	10.50

Dealers' Scrap

(Dealers' buying prices, f.o.b. New York in cents per pound.)

Copper and Brass

No. 1 heavy copper and wire	16 —16½
No. 2 heavy copper and wire	15 —15½
Light copper	14 —14½
Auto radiators (unsweated)	9 — 9½
No. 1 composition	11½—12
No. 1 composition turnings	11 —11½
Clean red car boxes	9¼— 9¾
Cocks and faucets	9¼— 9½
Mixed heavy yellow brass	7 — 7½
Old rolled brass	7½— 8
Brass pipe	9 — 9¼
New soft brass clippings	11¼—11¾
Brass rod ends	9¾—10¼
No. 1 brass rod turnings	9¼— 9¾

Aluminum

Alum. pistons with struts	4½— 5
Aluminum crankcases	6½— 7
2S aluminum clippings	9 — 9½
Old sheet & utensils	7 — 7½
Dry borings and turnings	2½— 3
Misc. cast aluminum	6½— 7
Dural clips (24S)	6 — 6½

Zinc

New zinc clippings	7 — 7½
Old zinc	5 — 5½
Zinc routings	3 — 3½
Old die cast scrap	3 — 3½

Nickel and Monel

Pure nickel clippings	16 —17
Clean nickel turnings	12½—13
Nickel anodes	16 —17
Nickel rod ends	16 —17
New Monel clippings	12 —13
Clean Monel turnings	7 — 8
Old sheet Monel	10 —10½
Old Monel castings	7½— 8
Inconel clippings	8 — 8½
Nickel silver clippings, mixed	8 — 8½
Nickel silver turnings, mixed	6½— 7

Lead

Soft scrap lead	12 —12½
Battery plates (dry)	7 — 7½

Magnesium Alloys

Segregated solids	7½— 8
Castings	4½— 5½

Miscellaneous

Block tin	75 —77
No. 1 pewter	60 —62
No. 1 auto babbitt	45 —47
Mixed common babbitt	13½—14
Solder joints	16½—17
Siphon tops	45 —47
Small foundry type	16 —16½
Monotype	15 —15½
Lino. and stereotype	14 —14½
Electrotype	11½—12
New type shell cuttings	14½—15
Clean hand picked type shells	6½— 7
Lino and stereo dross	6½— 7
Electro dross	4½— 5

Iron and Steel Prices . . .

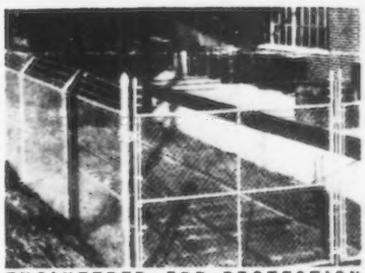
Steel prices shown here are f.o.b. basing points in cents per pound or dollars per gross ton unless otherwise indicated. Extras apply. Delivered prices do not reflect 3 pct tax on freight. Industry practice has discontinued arbitrary f.o.b. prices at Gulf and Pacific Ports. Space limitations prevent quotation of delivered prices at major ports. (1) Commercial quality sheet grade; primes, 25¢ above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Cokes, 1.25 lb, deduct 20¢ per base box. (6) For merchant trade. (7) For straight length material only from producers to fabricators. (8) Also shafting. For quantities of 40,000 lb & over. (9) Carload lot in manufacturing trade. (10) Delivered Los Angeles only. (11) Hollowware enameling, gages 2+ to 31 only. (12) Produced to dimensional tolerances in AISI Manual Sec. 6. (13) Delivered San Francisco only. (14) Kaiser Co. prices (15) to 0.035 to 0.075 in. thick by ¾ to 3½ in. wide. (16) Delivered Los Angeles; add ½¢ per 100 lb for San Francisco. (17) Slab prices subject to negotiation in most cases. Some producers charge (18) $2 more. (19) $1 more. (20) One Chicago producer charges 0.30¢ more for HR strip and 0.40¢ more for CR strip.

Basing Points	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio		San Franc'co, Los Angeles, Seattle	DELIVERED TO Detroit	New York	Philadelphia
INGOTS Carbon, rerolling	($36.00 per net ton f. o. b. mill) (Spot market as high as $75 to $90 gross ton)														
Carbon, forging	$46.00	(per net ton)													
Alloy	$56.00									(Canton = $56.00)					
BILLETS, BLOOMS, SLABS Carbon, rerolling[17]	$45.00[18]	$45.00[18]	$45.00[18]	$47.00	$45.00[18]	$45.00[18]	(per net ton)								
Carbon, forging billets	$54.00	$54.00	$54.00	$54.00	$54.00	$54.00	(per net ton)								
Alloy	$66.00	$66.00				$66.00	(Bethlehem, Massillon, Canton = $66.00)								
SHEET BARS								Subject to negotiation							
PIPE SKELP	2.90¢						2.90¢								
WIRE RODS	2.80¢[19]	2.80¢		2.80¢	2.85¢		(Worcester = 2.90¢)					3.52¢[13]			
SHEETS Hot-rolled	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢		(Ashland, Ky. = 2.60¢)		3.54¢[16]	2.96¢	3.148¢	3.040¢
Cold-rolled[1]	3.55¢	3.55¢	3.55¢	3.55¢		3.55¢	3.55¢		3.65¢	3.55¢			3.71¢	4.00¢	4.016¢
Galvanized (10 gage)	3.95¢	3.95¢	3.95¢		3.95¢		3.95¢	3.95¢	4.05¢	3.95¢	(Ashland = 3.95¢)	4.62¢[16]		4.298¢	4.190¢
Enameling (12 gage)	3.95¢	3.95¢	3.95¢	3.95¢			3.95¢		4.05¢	3.95¢			4.11¢	4.466¢	4.408¢
Long ternes[2] (10 gage)	4.05¢		4.05¢											4.566¢	4.508¢
STRIP Hot-rolled[3]	2.80¢	2.80¢[20]	2.80¢	2.80¢[15]	2.80¢		2.80¢					3.60¢[16]	2.96¢	3.316¢	3.256¢
Cold-rolled[4]	3.55¢	3.65¢[20]	3.65¢	3.55¢			3.55¢			(Worcester = 3.75¢)			3.71¢	4.066¢	4.006¢
Cooperage stock	3.10¢	3.10¢			3.10¢		3.10¢							3.616¢	
TINPLATE Cokes, 1.50 lb[5], base box	$6.80	$6.80	$6.80		$6.90			$6.90	$6.90	(Warren, Ohio = $6.80)				$7.248	$7.140
Electro, box 0.25 lb	Deduct $1.00 from 1.50 lb coke base box price.														
Electro, box 0.50 lb	Deduct 80¢ from 1.50 lb coke base box price.														
Electro, box 0.75 lb	Deduct 60¢ from 1.50 lb coke base box price.														
TERNES, MFG., special coated	Deduct 90¢ from 1.50 lb coke base box price.														
BLACKPLATE, CANMAKING 55 lb to 70 lb	Deduct $1.60 from 1.50 lb coke base box.														
75 lb to 95 lb	Deduct $1.70 from 1.50 lb coke base box.														
100 lb to 128 lb	Deduct $1.60 from 1.50 lb coke base box.														
BLACKPLATE, h. e. 29 ga[11]	4.75¢	4.75¢	4.75¢		4.85¢			4.85¢	4.85¢					5.198¢	5.090¢
BARS Carbon steel	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢					3.625¢[16]	3.06¢	3.35¢	3.356¢
Rail steel[6]	Subject to negotiation because of fluctuating scrap prices.														
Reinforcing (billet)[7]	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢				3.325¢[16]		3.098¢	2.990¢
Reinforcing (rail)	Subject to negotiation because of fluctuating scrap prices.														
Cold-finished[8]	3.55¢	3.55¢	3.55¢	3.55¢		3.55¢							3.71¢	4.00¢	4.006¢
Alloy, hot-rolled	3.30¢	3.30¢	3.30¢			3.30¢	3.30¢	(Bethlehem, Massillon, Canton = 3.30¢)							3.432¢
Alloy, cold-drawn	4.10¢	4.10¢	4.10¢	4.10¢		4.10¢			(Canton = 4.10¢)						
PLATE Carbon Steel[12]	2.95¢	2.95¢	2.95¢	2.95¢	2.95¢		2.95¢	(Coatesville = 3.45¢, Claymont = 3.65¢, Geneva, Utah = 3.10¢) 2.95¢				3.838¢[14]		3.298¢	3.190¢
Floor plates	4.20¢	4.20¢		4.20¢										4.716¢	4.658¢
Alloy	3.80¢	3.80¢	3.80¢		(Coatesville = 4.80¢)									4.316¢	4.256¢
SHAPES, Structural	2.80¢	2.80¢	2.80¢		2.80¢	2.80¢	(Geneva, Utah = 2.95¢, Bethlehem = 2.80¢)					3.43¢[10]		3.040¢	2.932¢
SPRING STEEL, C-R 0.08 to 0.40 carbon	3.55¢			3.55¢			(Worcester = 3.75¢)								
0.41 to 0.60 carbon	5.05¢			5.05¢			(Worcester = 5.25¢)								
0.61 to 0.80 carbon	5.65¢			5.65¢			(Worcester = 5.85¢)								
0.81 to 1.05 carbon	7.15¢			7.15¢			(Worcester = 7.35¢)								
1.06 to 1.35 carbon	9.45¢			9.45¢			(Worcester = 9.65¢)								
MANUFACTURERS' WIRE[9] Bright	3.55¢	3.55¢		3.55¢	3.55¢		(Worcester = 3.65¢, Duluth = 3.60¢)					4.56¢[13]		4.022¢	4.006¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire Base														
Spring (high carbon)	4.60¢	4.60¢		4.60¢	(Worcester = 4.70¢, Duluth = 4.85¢)				(Trenton = 4.85¢)			5.737¢[13]		5.072¢	4.964¢
PILING, Steel sheet	3.30¢	3.30¢				3.30¢								3.75¢	3.756¢

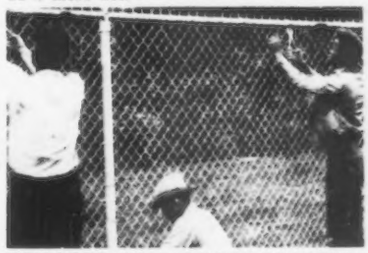
CUT PROPERTY PROTECTION COSTS WITH LONGER-LASTING KONIK

● In Continental Chain Link you have the only fence made of rust-resistant KONIK metal. Continental KONIK is made of open hearth steel containing copper, nickel and chromium. These elements give the fence greater strength . . . extra elasticity. These are the elements that give KONIK the extra resistance to rust and atmospheric corrosion which it possesses. The special galvanizing process used by Continental adds a uniform coating of protective zinc to the already superior KONIK metal. Build permanence into your property protection with Continental Chain Link fence. Here is the only fence that provides protection for your property at such low cost per year of fence life. Contact our nearest representative or call Continental at Kokomo . . . you'll like the help you get from our fence engineers.

A CARD WILL BRING THIS FREE BOOK
Get your copy of "Planned Protection"—a complete manual on modern protection and control of property. Write or phone the Continental Steel Corporation, or nearest sales office.



ENGINEERED FOR PROTECTION
Continental fence has 14 distinctive construction features including heavier line posts . . . stronger and more easily operated gates . . . improved pivot-type hinges . . . self-locking barb arms . . . full gage wire of KONIK steel . . . fastened with 20% more ties.



TAILORED TO FIT YOUR PROPERTY
Experienced fence engineers plan and help erect Continental Chain Link fence. They work with you in laying out the most effective and economical installation to harmonize with the character of property, and to provide the type of protection you need.

CONTINENTAL STEEL

CONTINENTAL STEEL CORPORATION

GENERAL OFFICES • KOKOMO, INDIANA

PRODUCERS OF *Manufacturer's Wire* in many sizes, shapes, tempers and finishes, including Galvanized, KOKOTE, Flame-Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright, Lead Coated, and special wire. ALSO, Coated and Uncoated Steel Sheets, Nails, Continental Chain Link Fence, and other products.

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

Basing Point	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila.	Subject to negotiation			Subject to negotiation		
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt.	Subject to negotiation			Subject to negotiation		
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	Subject to negotiation			Subject to negotiation		
Billets, P'gh, Chi, Canton, Watervliet, Syracuse, Balt, Beth.	Subject to negotiation			Subject to negotiation		
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Water, Syracuse, Ft. Wayne, Titusville, Beth, Brackenridge	23.00	22.50	17.50	17.50	21.00	25.50
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville, Beth, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet, Beth, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Plates, P'gh, Middletown, Canton, Brackenridge, Balt, Coatesville	31.50	29.50	23.50	24.00	28.00	33.00
Shapes, structural, P'gh, Chi, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Sheets, P'gh, Chi, Middletown, Canton, Balt, Brackenridge	39.00	37.00	29.00	31.50	35.50	39.50
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	25.50	23.50	18.50	19.00	26.00	38.00
Strip, c-r, P'gh, Cleve, Jersey City, Reading, Canton, Youngstown, Balt, W. Leechburg	32.50	30.50	24.00	24.50	35.00	56.50
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila, Ft. Wayne, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Wire, flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton, W. Leechburg	32.48	30.30	23.80	24.34	34.82	56.26
Rod, h-r, Syracuse	27.05	25.97	20.02	20.58	24.34	28.78
Tubing, seamless, P'gh, Chi, Canton, Brackenridge, Milwaukee	72.09	72.09	.....	68.49	.....	.....

TOOL STEEL

*(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. *Also Canton, Ohio)*

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	82¢
18	4	1	—	5	$1.29
18	4	2	—	—	93¢
1.5	4	1.5	8	—	59¢
6	4	2	6	—	63¢

High-carbon-chromium*	47¢
Oil hardening manganese*	26¢
Special carbon*	24¢
Extra carbon*	20¢
Regular carbon*	17¢

Warehouse prices on and east of Mississippi are 2¢ per lb higher; west of Mississippi, 4¢ higher.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	Per lb
Armature	4.80¢ to 5.05¢
Electrical	5.30¢ to 5.55¢
Motor	6.05¢ to 6.30¢
Dynamo	6.75¢ to 7.50¢
Transformer 72	7.25¢ to 8.25¢
Transformer 65	7.95¢ to 9.20¢
Transformer 58	8.65¢ to 9.90¢
Transformer 52	9.45¢ to 9.70¢

F.o.b. Chicago and Gary: armature through motor only. F.o.b. Granite City add to lower quotation 0.45¢ for armature through & 72, and 0.35¢ for balance.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb	
No. 1 O.H., per 100 lb	$2.75
Angle splice bars, 100 lb	3.85
(F.o.b. basing points)	*per 100 lb*
Light rails (from billets)	$3.10

	Base per lb
Cut spikes	4.85¢
Screw spikes	6.90¢
Tie plate, steel	3.65¢
Tie plates, Pittsburg, Calif.	3.80¢
Track bolts	7.00¢
Track bolts, heat treated, to railroads	7.25¢

Basing points, light rails, Pittsburgh, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, St. Louis, Kansas City, Minnequa, Colo.; Birmingham; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa.; Richmond.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C.	$7.05	$14.10

CLAD STEEL

Base prices, cents per pound

Stainless-clad	Plate	Sheet
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Coatesville, Pa	*24.00	*22.00
Nickel-clad 10 pct, f.o.b. Coatesville, Pa.	21.50	....
Inconel-clad 10 pct, f.o.b. Coatesville	30.00	....
Monel-clad 10 pct, f.o.b. Coatesville	24.00	....
Aluminized steel Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

* Includes annealing and pickling, or sandblasting.

MERCHANT WIRE PRODUCTS

To the dealer, f.o.b. Pittsburgh, Chicago, Birmingham

	Base Column per keg	San Francisco
Standard & coated nails*	94	115
Galvanized nails*	94	115
Woven wire fence†	100	123
Fence posts, carloads††	105	...
Single loop bale ties	99	123
Galvanized barbed wire**	113	133
Twisted barbless wire	113	...

* Also Duluth; Worcester, 6 columns higher. † 15½ gage and heavier. ** On 80-rod spools, in carloads. †† Pittsburgh, Duluth only.

	Base per 100 lb	San Francisco
Annealed fence wire ‡	$4.20	$5.21
Annealed, galv. fencing ‡	4.65	5.66
Cut nails, carloads ‡‡	6.30	...

‡ Add 10¢ at Worcester. ‡‡ Pittsburgh only, less 20¢ to jobbers.

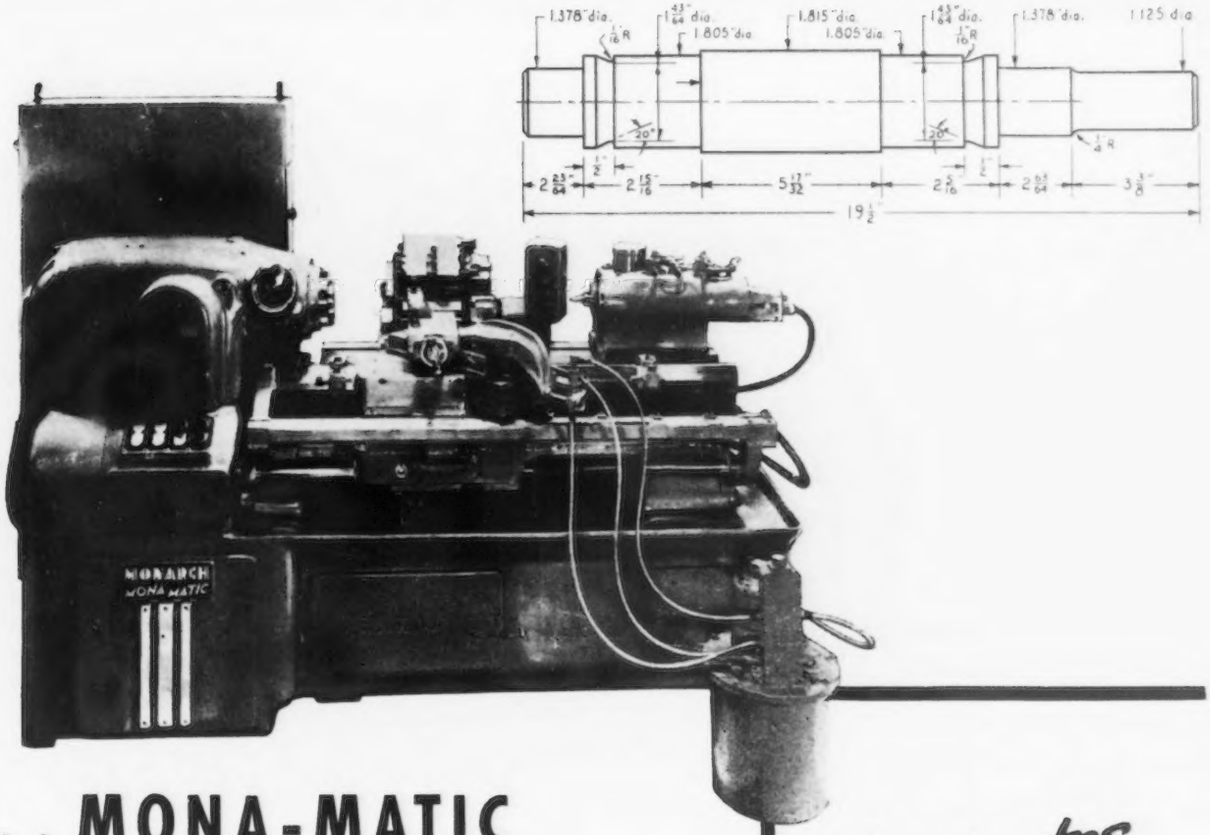
HIGH STRENGTH, LOW ALLOY STEELS

base prices, cents per pound

Steel	Alde-cor	Corten	Double Strength No. 1	Dyn-alloy	HI Steel	Mayari R	Otis-coloy	Yoloy	NAX High Tensile
Producer	Republic	Carnegie-Illinois, Republic	Republic	Alan Wood	Inland	Bethlehem	Jones & Laughlin	Youngstown Sheet & Tube	Great Lakes Steel
Plates	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55
Sheets									
Hot-rolled	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
Cold-rolled	5.30	5.30	5.30	....	5.30	5.30	5.30	5.30	5.30
Galvanized	....	6.00	....	....	....	6.00	....	....	....
Strip									
Hot-rolled	4.30	4.30	4.30	....	4.30	4.30	4.30	4.30	4.30
Cold-rolled	....	....	5.30	....	....	5.30	5.30	5.30	5.30†
Shapes	....	4.30	....	....	4.30	4.30	4.30	4.30	....
Beams	....	4.30	....	....	....	4.30	....	....	....
Bars									
Hot-rolled	4.45	4.45	4.45	....	....	4.45	4.45	4.45	4.45
Bar shapes	....	4.45	....	....	4.45	4.45	4.45	4.45	....

† Pittsburgh, add 0.10¢ at Chicago and Gary.

6 Diameters, 2 Necks and 2 Chamfers on a 19½" Shaft . . .



. . . MONA-MATIC MACHINING TIME — *2.81 minutes*

Here's a new wrinkle in high-speed shaft turning—for "*Peak Production at a Profit*".

Load. Push the cycle start button. The Monarch Mona-Matic does the rest; automatically and fast.

It's a powerful (10 to 20-hp capacity), high-speed machine, suitable for both first and second operation work. Multiple diameters, tapers, faces, radii and chamfers are turned by the single "Air-Gage Tracer" controlled cutting tool on the front carriage, guided from thin metal template or master workpiece. Tools on the rear slide perform necking, grooving and forming cuts.

This combination reduces the number of tools to the absolute minimum. Setup is accomplished in but a fraction of the time required when separate tools are employed for each cut.

The results possible with this tool for timesaving are typified by the job illustrated—a steel shaft, machined *complete*—in a matter of minutes—and a simple, versatile setup, equally adaptable to a wide variety of production work. May we show you how it can fit your requirements?

THE MONARCH MONA-MATIC

This modern, timesaving machine is a natural for high-speed precision metal turning with carbide tools. It's available in a number of speed ranges: 1000, 2000, 3000 and up to 4000 R.P.M.

The rear tool slide cycle may be cut in at any time during the front tool cycle. Or the machine may be used with the front single tool cycle only.

Supplied with a magazine loading device instead of the rear slide, the Mona-Matic becomes a completely automatic turning machine.

THE MONARCH MACHINE TOOL COMPANY • Sidney, Ohio

ACCURACY · ECONOMY · LONG LIFE
Monarch
TURNING MACHINES

FOR A GOOD TURN *FASTER*—TURN TO MONARCH

PIPE AND TUBING

Base discounts, f.o.b. Pittsburgh and Lorain, steel buttweld and seamless. Others f.o.b. Pittsburgh only
Base price, $200.00 per net ton

Standard, threaded & coupled

Steel, buttweld	Black	Galv.
½-in.	47	29½
¾-in.	50	33½
1-in.	52½	36½
1¼-in.	53	37
1½-in.	53½	37½
2-in.	54	38
2½ and 3-in.	54½	38½
Wrought Iron, buttweld		
⅛-in.	+11	+35
¼-in.	+ 1½	+25
1 and 1¼-in.	4	+16½
1½-in.	9½	+13
2-in.	10	+12½
Steel, lapweld		
2-in.	44½	28
2½ and 3-in.	48½	32
3½ to 6-in.	50½	34
Steel, seamless		
2-in.	43½	27
2½ and 3-in.	46½	30
3½ to 6-in.	48½	32
Wrought Iron, lapweld		
2-in.	1½	+20
2½ to 3½-in.	4	+16
4-in.	8	+10½
4½ to 8-in.	6	+12

Extra Strong, plain ends

Steel, buttweld		
½-in.	46	30
¾-in.	50	34
1-in.	52	37
1¼-in.	52½	37½
1½-in.	53	38
2-in.	53½	38½
2½ and 3-in.	54	39
Wrought Iron, buttweld		
½-in.	+ 6½	+29
¾-in.	+ ½	+23
1 and 1¼ in.	4	+16½
2-in.	10	+12½
Steel, lapweld		
2-in.	43½	28
2½ and 3-in.	48½	33
3½ to 6-in.	52	36½
Steel, seamless		
2-in.	42½	27
2½ and 3-in.	46½	31
3½ and 6-in.	50	34½
Wrought Iron, lapweld		
2-in.	4½	+16½
2½ to 4-in.	13	+ 6
4½ to 6-in.	9	+10½

Basing discounts for standard pipe are for threads and couplings. For threads only, buttweld, lapweld and seamless pipe, one point higher discount (lower price) applies. For plain ends, buttweld, lapweld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lapweld and seamless 3½-in. and larger four points higher discount (lower price) applies. F.o.b. Gary prices are one point lower discount on all buttweld. On buttweld and lapweld steel pipe, jobbers are granted a discount of 5 pct. On l.c.l. shipments, prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft, f.o.b. Pittsburgh in carload lots, cut length 4 to 24 ft, inclusive.

OD in In.	Gage BWG	Seamless Hot-Rolled	Seamless Cold-Drawn	Electric Weld Hot-Rolled	Electric Weld Cold-Drawn
2	13	$17.84	$20.99	$17.30	$20.36
2½	12	23.99	28.21	23.27	27.36
3	12	26.68	31.40	25.88	30.46
3½	11	33.35	39.26	32.35	38.08
4	10	41.40	48.70	40.16	47.24

CAST IRON WATER PIPE

Per net ton

6-in. to 24-in. del'd Chicago $91.12
6-in. to 24-in. del'd New York 89.18
6-in. to 24-in., Birmingham 79.50
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles for all rail shipment; rail and water shipment less 105.90

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

Consumer Prices

(Bolts and nuts f.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Base discount less case lots

Machine and Carriage Bolts

Percent Off List

½ in. & smaller x 6 in. & shorter ... 45
9/16 & ⅝ in. x 6 in. & shorter 46
¾ in. & larger x 6 in. & shorter 43
All diam, longer than 6 in. 41
Lag, all diam over 6 in. long 44
Lag, all diam x 6 in. & shorter 46
Plow bolts 54

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller 43
9/16 to 1 in. inclusive 42
1⅛ to 1½ in. inclusive 40
1⅝ in. and larger 35

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts	USS	SAE
7/16 in. and smaller	..	46
½ in. and smaller	44	..
½ in. through 1 in.	..	44
9/16 in. through 1 in.	43	..
1⅛ in. through 1½ in.	41	42
1⅝ in. and larger	35	..

In full case lots, 15 pct additional discount. For 200 lb or more, freight allowed up to 50¢ per 100 lb, based on Cleveland, Chicago, Pittsburgh.

Stove Bolts

Packages, nuts separate ..... 65 and 10
In bulk 75

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets (½ in. and larger)

Base per 100 lb

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham $5.65
F.o.b. Lebanon, Pa. 5.80

Small Rivets (7/16 in. and smaller)

Percent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham 55

Cap and Set Screws

(In packages) *Percent Off List*

Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in., SAE 1020, bright 53
¾ to 1 in. x 6 in., SAE 1035, heat treated 44
Set screws, oval points 56
Milled studs 29
Flat head cap screws, listed sizes ... 16
Fillister head cap, listed sizes 37

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Metallurgical grade, f.o.b. producing plant.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$35.00
65% but less than 70%	34.00
60% but less than 65%	33.00
Less than 60%	32.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)

Per Gross Ton

Old range, bessemer $5.95
Old range, nonbessemer 5.80
Mesabi, bessemer 5.70
Mesabi, nonbessemer 5.55
High phosphorus 5.55

Prices quoted retroactive to Jan. 1, 1947.

METAL POWDER

Prices in cents per pound in ton lots, f.o.b. shipping point.

Brass, minus 100 mesh ..... 24¢ to 28½¢
Copper, electrolytic, 100 and 325 mesh ..... 30⅝¢ to 34⅜¢
Copper, reduced, 150 and 200 mesh ..... 30½¢ to 32¢
Iron, commercial, 100, 200, 325, mesh 96 + % Fe carlots ... 10¢ to 17¢
Swedish sponge iron, 100 mesh, c.l.f. N. Y., carlots, ocean bags .. 7.4¢ to 8.5¢
Domestic sponge iron, minus 48 mesh ..... 10¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots ..... 5¢
Iron, hydrogen reduced, 300 mesh and finer, 98 + % Fe, drum lots ..... 63¢ to 80¢
Iron, electrolytic, unannealed, 325 mesh and coarser, 99 + % Fe.. 44¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe ..... 39½¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe ..... 90¢ to $1.75
Aluminum, 100, 200 mesh, carlots ..... 23¢ to 29¢
Antimony, 100 mesh ..... 44¢
Cadmium, 100 mesh $2.00
Chromium, 100 mesh and finer... $1.025
Lead, 100, 200 & 300 mesh 20½¢ to 25½¢
Manganese, minus 325 mesh and coarser ..... 59¢
Nickel, 100 mesh ..... 51½¢
Silicon, 100 mesh ..... 29¢
Solder powder, 100 mesh.. 8½¢ plus metal
Stainless steel, 302, minus 100 mesh 75¢
Tin, 100 mesh ..... 90¢
Tungsten metal powder, 98%-99%, any quantity, per lb..... $2.90
Molybdenum powder, 99%, in 100-lb kegs, f.o.b. York, Pa., per lb.. $2.65
Under 100 lb $2.90

COKE

Furnace, beehive (f.o.b. oven) Net Ton
Connellsville, Pa. ..... $12.00 to $13.00
Foundry, beehive (f.o.b. oven)
Connellsville, Pa. ..... 13.50 to 14.50
Foundry, Byproduct
Chicago, del'd $18.60
Chicago, f.o.b. 17.50
New England, del'd 20.40
Seaboard, Kearney, N. J., f.o.b.. 17.85
Philadelphia, f.o.b. 17.75
Swedeland, Pa., f.o.b. 17.75
Buffalo, del'd 20.15
Ashland, Ohio, f.o.b. 15.50
Painesville, Ohio, f.o.b. 16.60
Erie, del'd 19.95
Cleveland, del'd 17.90
Cincinnati, del'd 18.59
St. Louis, del'd 18.03
Birmingham, del'd 15.76

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick *Carloads, Per 1000*

No. 1 Ohio $67.00
First quality, Pa., Md., Ky., Mo., Ohio 73.00
First quality, New Jersey 78.00
Sec. quality, Pa., Md., Ky., Mo., Ohio 67.00
Sec. quality, New Jersey 70.00
No. 2 Ohio 59.00
Ground fire clay, net ton, bulk 10.50

Silica Brick

Pennsylvania and Birmingham $73.00
Chicago District and Alabama 82.00
Silica cement, net ton (Eastern) .. 12.50
East Chicago 13.50

Chrome Brick *Per Net Ton*

Standard chemically bonded, Balt., Plymouth Meeting, Chester $64.00

Magnesite Brick

Standard, Balt. and Chester $86.00
Chemically bonded, Baltimore 75.00

Grain Magnesite

std. ⅛-in. grains

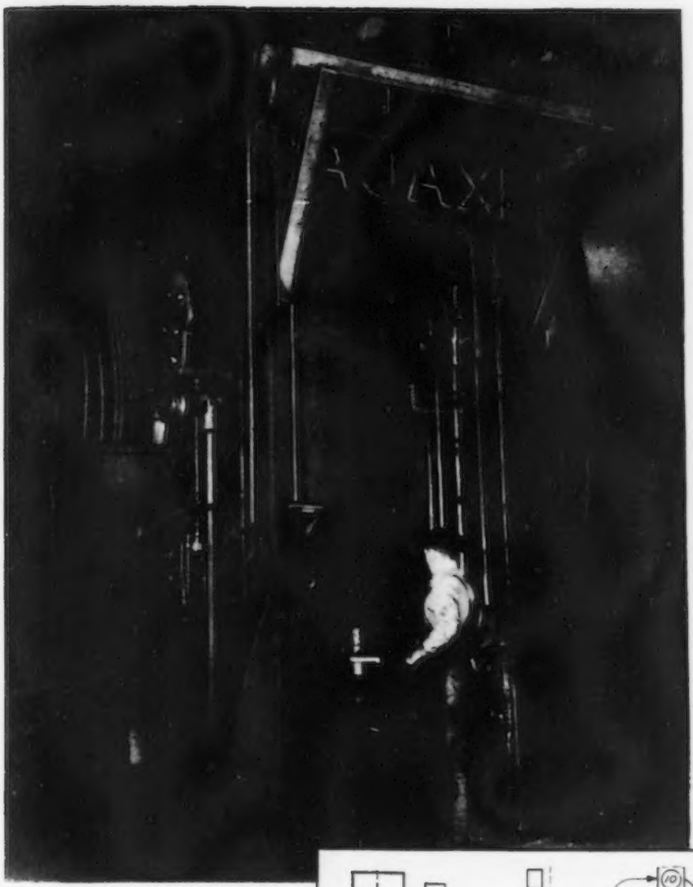
Domestic, f.o.b. Balt. and Chester in bulk, fines removed $51.50
Domestic, f.o.b. Chewelah, Wash., in bulk with fines 27.00
in sacks with fines 31.50

Dead Burned Dolomite

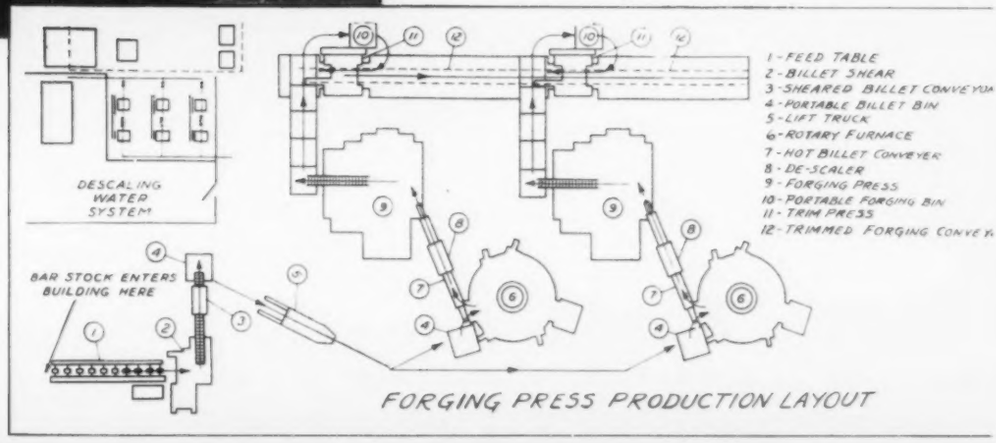
F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk. Midwest, add 10¢; Missouri Valley, add 20¢ .$11.05

AJAX PRESS FORGING DEPENDABILITY

the key to Production Line Forging



● The uninterrupted high speed forging production of the AJAX PRESS makes it practical and most profitable to operate a completely conveyorized plant with rotary or pusher type furnace, de-scaler, forging press and trim press in continuous line operation. The diagram below shows the layout of a forge shop in which two AJAX HIGH SPEED PRESSES (see No. 9 in diagram) are properly located for their important part in line production of high quality forgings at a high rate of production. Built on the basis of mechanical soundness, to require a minimum of down-time for die change or maintenance, and built to provide sustained high speed operation, the AJAX PRESS has that dependability we refer to as the key to successful production line forging.



FORGING PRESS PRODUCTION LAYOUT

WRITE FOR BULLETIN 75-B

THE AJAX MANUFACTURING COMPANY

EUCLID BRANCH P. O. CLEVELAND 17, OHIO

110 S. DEARBORN ST. CHICAGO 3, ILLINOIS

DEWART BUILDING NEW LONDON, CONN.

WAREHOUSE PRICES

Base prices, delivered metropolitan areas, per 100 lb.

CITIES	SHEETS			STRIP		PLATES	SHAPES	BARS		ALLOY BARS			
	Hot-Rolled	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled		Standard Structural	Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615 As-rolled	Hot-Rolled, A 4140-50 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140-50 Ann.
Philadelphia	$4.51	$5.78	$5.91	$4.83	$5.73	$4.86	$4.57	$4.88	$5.58	$8.52	$8.67	$10.13	$10.28
New York	4.76	5.78[1]	6.16	5.09	6.07	5.11	4.80	5.08	5.63	8.58	8.73	10.18	10.33
Boston	4.83	5.69	6.23[12]	5.61	6.87	5.18	4.91	5.04	5.69	8.20	8.35	9.50	9.65
Baltimore	4.33	....	5.73	4.81	....	4.78	4.73	4.86	5.56	....	....	....	....
Norfolk	4.90	....	....	5.30	....	5.15	5.15	5.20	6.00	....	....	....	....
Chicago	4.25	5.10	5.65	4.35	5.45	4.60	4.40	4.40	5.10	8.20	8.35	9.50	9.65
Milwaukee	4.458	5.308	5.858	5.058	5.658	4.808	4.608	4.608	5.395	8.495	8.795	9.945	10.095
Cleveland	4.25	5.10[1]	5.81	4.55	....	4.60†	4.68	4.40	5.10	8.51	8.66	9.50	9.65
Buffalo	4.25	5.10	6.05	5.25	5.70[5]	5.00	4.40‡	4.40‡	5.10	8.20	8.35	9.50	9.65
Detroit	4.10	5.28	6.07	4.77	5.67	4.92†	4.82	4.58-4.82	5.26	8.82	8.97	10.09	10.24
Cincinnati	4.55	5.21	5.78	4.79	5.74	4.99	4.84	4.79	5.49	8.73	8.88	10.04	10.19
St. Louis	4.61	5.46	6.07	4.71	5.87	4.96	4.76	4.76	5.52	8.77	8.92	10.07	10.22
Pittsburgh	4.25	5.10[1]	5.65	4.35	....	4.60	4.40	4.40	5.10	8.20	8.37	9.50	9.65
St. Paul	4.68	5.53	6.08	4.78	....	5.03	4.83	4.83	6.00	....	....	....	....
Omaha	5.262	....	6.712	5.362	....	5.612	5.412	5.412	6.112	....	....	....	....
Indianapolis	4.59	5.36	5.91	4.69	5.79	4.94	....	4.74	5.44	....	....	....	....
Birmingham	4.45[11]	....	5.65	4.45[11]	....	4.65[11]	4.40[11]	4.40[11]	6.13	....	....	....	....
Memphis	4.88[11]	5.94[1]	6.43	5.08[11]	....	5.23[11]	5.03[11]	5.03[11]	5.94	....	....	....	....
New Orleans	*5.05[11]	6.39[1]	....	5.25[11]	....	5.40[11]	*5.10[11]	*5.20[11]	6.39[6]	....	....	....	....
Houston	5.75[9]	....	7.36	6.00[9]	....	5.85[9]	5.85[9]	5.35[17]	7.00	9.40	9.25	10.40	10.55
Los Angeles	5.75	7.35[1]	7.40	6.05	8.70[5]	5.55	5.35[5]	5.50	7.35[14]	9.70[15]	9.55[10]	11.15[15]	11.30[15]
San Francisco	5.40[6]	6.65	7.05	5.75[8]	8.70	5.50	5.20	5.05	7.50	9.70[15]	9.55[15]	11.15[15]	11.30[15]
Seattle	5.45[4]	7.25[2]	6.85	5.60[4]	....	5.60[4]	5.25[4]	5.45[4]	7.45[14]	....	8.95[16]	....	11.30[16]
Portland	5.30[4]	7.10[2]	6.70	5.60[4]	....	5.45[4]	5.25[4]	5.55[4]	7.45[14]	....	....	....	....
Salt Lake City	6.40	....	7.85	6.70	....	6.20	6.35	6.55	7.55	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1999 lb; strip, extras on all quantities; bars 1000 lb and over.

ALLOY BARS: 1000 to 1999 lb.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 9999 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999 lb; (8) 400 lb and over; (9) 500 to 1999 lb; (10) 500 to 999 lb; (11) 400 to 3999 lb; (12) 450 to 3749 lb; (13) 400 to 1999 lb; (14) 1500 lb and over; (15) 1000 to 4999 lb; (16) 4000 lb and over; (17) up to 1999 lb.

* Add 46¢ for sizes not rolled in Birmingham
† Up to ¾ in. thick and 90 in. wide.
‡ Add 40¢ for sizes not rolled at Buffalo.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums. Delivered prices do not include 3 pct tax on freight.

BASING POINT* PRICES

Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	40.00	40.50	41.00	41.50	.....
Birmingham	38.88	36.38-39.38	.....	.....	.....
Buffalo	40.00-45.00*	40.00-45.50*	40.50-46.00*	.....	.....
Chicago	38.50	39.00	39.50	40.00	.....
Cleveland	38.50-39.75*	39.00-40.25*	39.50-40.75*	.....	.....
Duluth	39.00	39.50	40.00	40.50	.....
Erie	38.50	39.00	39.50	40.00	.....
Everett	....	45.00	45.50	.....	.....
Granite City	39.50	40.00	40.50	.....	.....
Neville Island	39.00	39.50	39.50	40.00	.....
Provo	39.00	39.50	.....	.....	.....
Sharpsville	39.00	39.50	39.50	40.00	.....
Steelton	40.00	.....	.....	.....	46.00
Struthers, Ohio	39.50	.....	.....	.....	.....
Swedeland	45.00	45.50	46.00	46.50	.....
Toledo	38.50	39.00	39.50	40.00	.....
Troy, N. Y.	....	....	....	....	46.00
Youngstown	39.00	39.50	39.50	40.00	.....

DELIVERED PRICES† (BASE GRADES)

Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	$0.50 Arb.	....	45.50	46.00	.....	.....
Boston	Steelton	5.78	45.78	....	....	....	51.78
Brooklyn	Bethlehem	3.60	43.60	44.10	44.60	45.10	.....
Cincinnati	Birmingham	5.85	44.73	42.23-45.23	.....	.....	.....
Jersey City	Bethlehem	2.21	42.21	42.71	43.21	43.71	.....
Los Angeles	Provo	7.13	46.13	46.63	....	....	.....
Mansfield	Cleveland-Toledo	2.56	41.06-42.31*	41.56-42.81*	42.06-43.31*	42.56	.....
Philadelphia	Bethlehem	2.00	42.00	42.50	43.00	43.50	.....
Philadelphia	Swedeland	1.21	46.21	46.71	47.21	47.71	.....
Philadelphia	Steelton	2.59	42.59	....	.....	.....	48.59
San Francisco	Provo	7.13	46.13	46.63	.....	.....	.....
Seattle	Provo	7.13	46.13	46.63	.....	.....	.....
St. Louis	Granite City	0.75 Arb.	40.25	40.75	41.25	.....	.....

* Republic Steel Corp. price. Basis: Average price of No. 1 hvy. mlt. steel scrap at Cleveland or Buffalo respectively as shown in last week's issue of THE IRON AGE. Price is effective until next Sunday midnight.

Basing point prices are subject to switching charges; silicon differential (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron (blast furnace) silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—$49.50; f.o.b. Buffalo—$50.75. Add $1.25 per ton for each additional 0.50 pct Si, up to 12 pct. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

Charcoal pig iron base price for low phosphorus $55.00 per gross ton, f.o.b. Lyle, Tenn. Delivered Chicago, $62.46. High phosphorus charcoal pig iron is not being produced.

"take it" from Chief Keokuk...

60 30 12½

that's KEOKUK Electro-Silvery

Keokuk Electro-Silvery . . . 60 pound, 30 pound and 12½ pound . . . all are uniform in size and weight and all contain extremely accurate percentages of silicon, iron and alloys. Distinctively modern pigging machines, developed by Keokuk, provide this accuracy. Keokuk's special manufacturing process permits frequent metallurgical tests assuring thorough and constant control.

STEEL PLANTS

60-pound Keokuk Electro-Silvery Pigs for blocking the open hearth heat. For equal distribution of silicon and best temperature melt-down. Handle by magnet.

FOUNDRIES

30-pound Keokuk Electro-Silvery Pigs for charging mechanically or by hand into the cupola. Easily broken into two or more pieces, handled by magnet and measured by weight. Regular or alloy analysis.

12½-pound Keokuk Electro-Silvery Piglets so uniform in weight that they may be charged into the cupola by count, eliminating weighing operations. Handle by magnet. Regular or alloy analysis.

KEOKUK ELECTRO-METALS COMPANY

KEOKUK, IOWA

SALES AGENTS: MILLER AND COMPANY, 332 S. MICHIGAN AVENUE, CHICAGO 4, ILLINOIS
CINCINNATI 2, OHIO, 3504 CAREW TOWER • ST. LOUIS 1, MISSOURI, 407 N. EIGHTH ST.

Ferromanganese

78-82% Mn, Maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockwood, Tenn.

Carload lots (bulk)	$145
Less ton lots (packed)	189.00
Delivered Pittsburgh	151.00

$1.80 for each 1% above 82% Mn; penalty, $1.80 for each 1% below 78%.

Briquets—Cents per pound of briquet, freight allowed, 66% contained Mn.

	Eastern	Central	Western
Carload, bulk	8.70	8.95	9.50
Ton lots	10.30	10.90	12.80
Less ton lots	11.20	11.80	13.70

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$46.00	$47.00
F.o.b. Pittsburgh	50.00	51.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, f.o.b. shipping point, freight allowed, eastern zone.

96% min. mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	32
L.c.l. lots	34

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	32
Ton lots	34
Less ton lots	36

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	Ton	Less
0.07% max. C. 0.06% P, 90% Mn.	23.00	24.85	26.05
0.10% max. C.	22.50	24.35	25.55
0.15% max. C.	22.00	23.85	25.05
0.30% max. C.	21.50	23.35	24.55
0.50% max. C.	21.00	22.85	24.05
0.75% max. C., 7.00% max. Si.	18.00	19.85	21.05

Silicomanganese

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed, 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload bulk	7.80
Ton lots	9.45
Briquet, contract basis, carlots, bulk freight allowed, per lb of briquet	8.75
Ton lots	10.35
Less ton lots	11.25

Silvery Iron (electric furnace)

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, openhearth $78.00, foundry, $79.00; $78.75 f.o.b. Niagara Falls; $77.50 f.o.b. Jackson, Ohio. Electric furnace silvery iron is not being produced at Jackson. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for each 0.50 pct Mn over 1 pct.

Silicon Metal

Contract price, cents per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots packed.

	Eastern	Central	Western
96% Si, 2% Fe	16.90	17.50	18.10
97% Si, 1% Fe	17.30	17.90	18.50

Silicon Briquets

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si, 1 lb Si briquets.

	Eastern	Central	Western
Carload, bulk	5.25	5.50	5.70
Ton lots	6.85	7.45	7.75
Less ton lots	7.75	8.35	8.65

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
25% Si	15.50	....	....
50% Si	9.30	9.80	10.00
75% Si	11.80	12.10	12.85
85% Si	13.30	13.60	14.35
90% Si	15.00	15.30	16.00

Ferrochrome (65-72% Cr, 2% max. Si)

Contract prices, cents per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	26.50	26.90	27.00
0.10% C	26.00	26.40	26.50
0.15% C	25.50	25.90	26.00
0.20% C	25.25	25.65	25.75
0.50% C	25.00	25.40	25.50
1.00% C	24.50	24.90	24.75
2.00% C	24.25	24.65	24.75
65-69% Cr, 4.9% C	18.60	19.00	19.15
62-66% Cr, 4-6% C, 6-9% Si.	18.60	19.00	19.15

Briquets — Contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.

	Eastern	Central	Western
Carload, bulk	12.50	12.75	12.85
Ton lots	14.00	14.90	15.50
Less ton lots	14.90	15.80	16.40

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chromium contained, lump size, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	19.70	20.10	20.25
Ton lots	21.85	23.15	23.95
Less ton lots	23.35	24.65	25.45

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% mn, 1.25% max. C.

	Eastern	Central	Western
Carload	25.00	25.40	25.50
Ton lots	27.30	27.95	29.15
Less ton lots	29.10	29.75	30.95

Chromium Metal

Contract prices, cents per lb, chromium contained carload packed, f.o.b. shipping point freight allowed, 97% min. Cr. 1% max. Fe.

	Eastern	Central	Western
0.20% max. C.	97.00	98.50	99.75
0.50% max. C.	93.00	94.50	95.75
9.00% min. C.	91.50	93.00	94.25

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe or 28-32% Ca, 60-65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	16.25	16.75	18.80
Ton lots	19.35	20.10	22.25
Less ton lots	20.85	21.60	23.75

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

	Eastern	Central	Western
Carloads	17.50	18.00	20.05
Ton lots	19.80	20.65	22.40
Less ton lots	20.80	21.65	23.40

Calcium Metal

Eastern zone contract prices, cents per pound of metal, f.o.b. shipping point, freight allowed. Add 1.5¢ for central zone; 3.5¢ for western zone.

	Cast Turnings	Distilled
Ton lots	$1.85	$2.70	$3.40
Less ton lots	2.20	3.05	4.20

CMSZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-500% C.

	Eastern	Central	Western
Ton lots	18.00	19.10	21.05
Less ton lots	19.25	20.35	22.30

SMZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed. 60-65% Si, 5-7% Mn. 5-7% Zr, 20% Fe, ½ in. x 12 mesh.

	Eastern	Central	Western
Ton lots	15.75	16.85	18.80
Less ton lots	17.00	18.10	20.05

Other Ferroalloys

Ferrotungsten, standard, lump or ¼ x down, packed, f.o.b. plant Niagara Falls, Washington, Pa., York, Pa., per pound contained W, 5 ton lots, freight allowed	$2.25
Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.	
Openhearth	$2.90
Crucible	3.00
High speed steel (Primos)	3.10
Vanadium pentoxide, 88-92% V_2O_5 contract basis, per pound contained V_2	$1.30
Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb	
Ton lots	$2.50
Less ton lots	$2.55
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo.	95¢
Calcium molybdate, 40-45%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo.	80¢
Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo.	80¢
Molybdenum oxide in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo.	80¢
Ferrotitanium, 40-45%, 0.10% C max., f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti	$1.21
Less ton lots	$1.25
Ferrotitanium, 20-25%, 0.10% C max., ton lots, per pound contained Ti	$1.35
Less ton lots	$1.40
High carbon ferrotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads, per net ton	$142.50
Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. (Siglo) Tenn., $3 unitage per gross ton	$65.00
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Carload lots	18.40¢
Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy	
Carload, bulk	6.00¢
Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.	
Carload	6.90¢
Ton lots	7.40¢
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Car lots	9.50¢
Ton lots	10.25¢

Boron Agents

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed.

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

Eastern	Central	Western
$1.20	$1.23	$1.21

Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.			
Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.044
Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.			
Less ton lots	$1.80	$1.8125	$1.8445

Silcaz, contract basis, f.o.b. plant freight allowed, per pound.

Carload lots	39.00¢

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 50 lb and over.

No. 1	93¢
No. 6	63¢
No. 79	45¢

Bortram, f.o.b. Niagara Falls

Ton lots, per pound	45¢
Less ton lots, per pound	50¢

Carbortam,* f.o.b., Suspension Bridge, N. Y., freight allowed, Ti 15-17%, B 0.90-1.15%, Si 2.5-3.0%, Al 1.0-2.0%.

Ton lots, per pound	8.0¢

Borosil, f.o.b. Philo, Ohio, freight allowed, B 3%-4%, Si 40%-45%, per lb contained B | $6.25

(CONTINUED FROM PAGE 148

in. deep, in one pass. When the cut is completed, one return pass without downfeed allows the wheel to cut itself free and provides a fine finish. The complete operation takes only about 1½ min. for an average size tool. From ½ to 1 hp is required to maintain a cutting speed of about 5000 sfm. Wheels are furnished with a sharp 90° corner on one side and 1/32 in. radius on the other. The corner and radius maintain their shape and do not require redressing. Wheels are available in 3/32 and ⅛-in. thickness and in 3, 6 and 8-in. diam. *Wickman Corp.*, 15533 Woodrow Wilson Ave., Detroit 3.

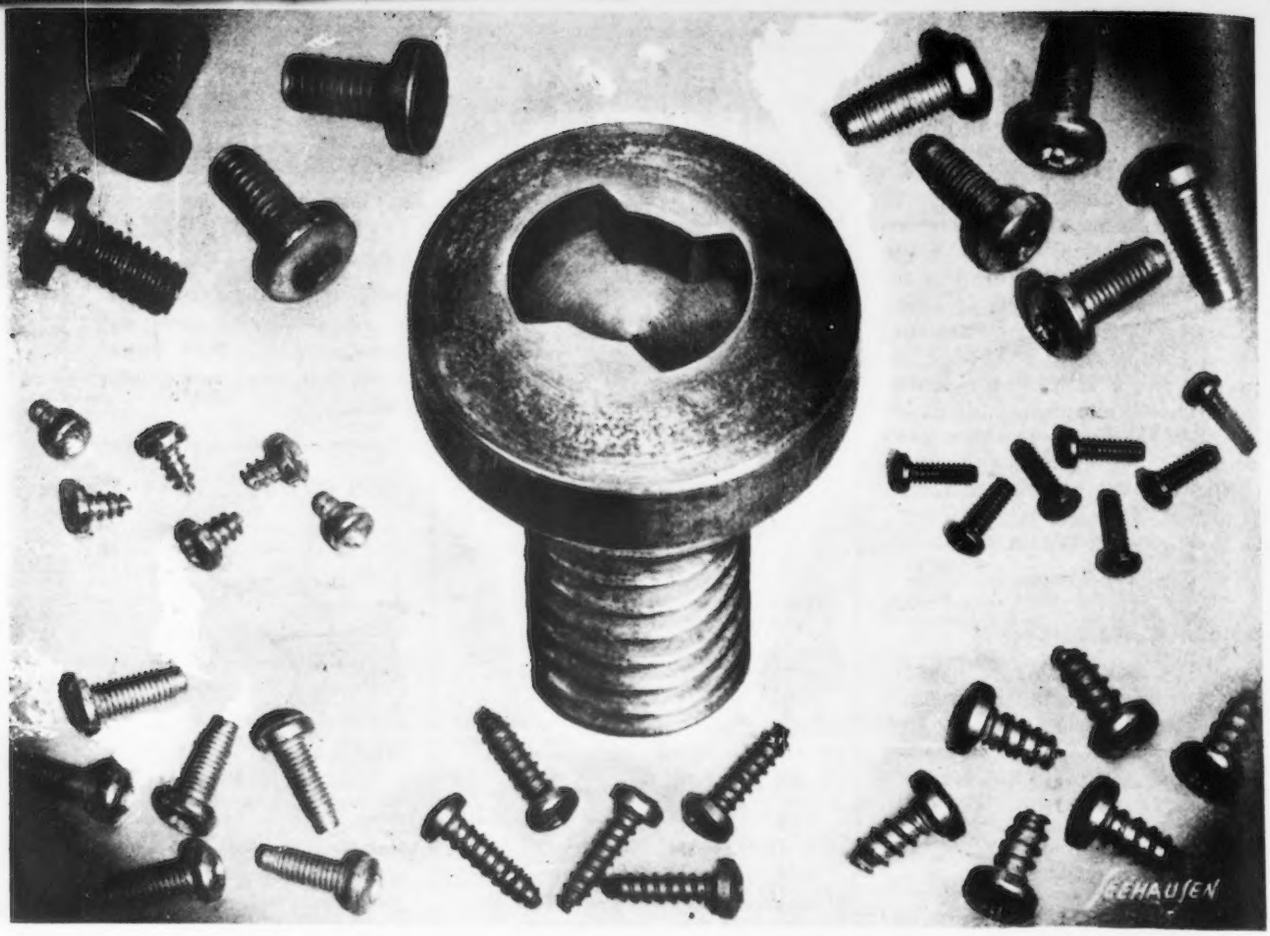
Circular Cutter Bit

A NEW cutter bit for turning, boring and facing is reported to be the only circular cutting tool bit on the market. By rotating the bit, 20 to 50 new cutting edges may be presented to the work, eliminat-

ing production delays for tool resharpening. The life of the cutting edge is said to be greater than that of conventional tools because the shearing action and the manner in which the chip is removed in cutting tends to keep it sharp. By preforming the tool in manufacture for optimum cutting, the manufacturer states that there is no problem involving rake angles. The finish produced by the circular bit usually eliminates the necessity for grinding, filing, reaming, or polishing to remove tool marks, and production and turning speeds are faster. *Shearcut Tool Co.*, Box 746, Reseda Post Office, Los Angeles.

Curved Tooth Mill

ADDITION of a carbide tipped curved tooth milling cutter to a line of curved tooth milling cutters combines the curved tooth design with the metal removing characteristics of carbide. The cutter body, of special analysis steel, is



Introducing... PAN HEAD

Newest Member of the CLUTCH HEAD *Family*

This is the new style head approved by the American Standard Association . . . as shown in their Publication A. S. A. B-18-6—1947

America's Most Modern Screw now makes Pan Head with the Clutch Recess available in all standard sizes . . . a full-ranking member of the CLUTCH HEAD family of Machine Screws, Sheet Metal and Thread-forming Screws.

The A.S.A. establishment of the Pan Head as a standard style works in the interest of economy to the user. Experience to date indicates that Pan Head will eventually supersede Round Heads and possibly other style heads . . . with a resultant simplification of inventory by reducing the variety of screws carried in stock.

Since its adaptation to the Clutch Recess, the versatility of the Pan Head, in structure and finished appearance, has met with such popular acceptance by CLUTCH HEAD users that we recommend its investigation from the angles of economy and greater efficiency.

The Pan Head lends itself in a high degree of adaptability to the special features of the Clutch Recess . . . features not matched by any other screw and which have won for CLUTCH HEAD recognition as "America's Most Modern Screw."

SEND FOR

Your request will bring you package assortment of screws, including Pan Head; sample Type "A" Bit and illustrated Brochure. At your own desk,

CLUTCH HEAD SCREWS

SAMPLES

you can check CLUTCH HEAD'S *exclusive features for safer, faster, and easier driving... accorded credit for stepping up assembly productions 15% to 50%.*

UNITED SCREW AND BOLT CORPORATION

CLEVELAND 2 CHICAGO 8 NEW YORK 7

provided with a special locking screw which locks the carbide blade rigidly to the cutter body, eliminating tipping or side motion. It is said the curved tooth shearing action counteracts the inherent brittleness of carbide and reduces the

amount of horsepower required for machining operations. The cutters over 1-in. wide come equipped with inserted carbide blades, those under 1-in. wide have brazed-in carbide blades. These cutters eliminate chatter and reduce down time. *Aber Engineering Works, Inc.*, Waterford, Wis.

Boring Tool Set

DESIGNED to end repeated trips to the tool room for different boring tools and setup accessories, a new combination set of boring bars and accessories contains various size super micrometer fly cutter tools, an offset boring and facing head, jacks, parallels and adaptors. This tool assembly is especially useful on horizontal and vertical boring machines. In a typical set there are seven different

sized super micrometer boring tools, that have an infinite cutting range in diameters from 1¼ to 7 in. For boring both larger and smaller holes, there is a micrometer graduated boring and facing head with a working range from 0 to 13 in. This head is equipped with dif-

ferent type cutters which can be mounted in the tool slide either parallel to or at right angles to the tool shank, permitting boring or facing to precision limits. Design of the micrometer adjusted fly cutters in this set permits making cutter settings which will produce the precision bores desired. The micrometer graduated dial adjusts for the cut. Through use of a serrated type fly cutter mating with a correspondingly serrated expanding plunger operated by the micrometer adjusting screw, positive adjustment and accuracy to within 0.0002 in. diam is assured. Suitable adaptors are provided for the smaller size stub tools. *Davis Boring Tool Div., Giddings & Lewis Machine Tool Co.*, Fond du Lac, Wis.

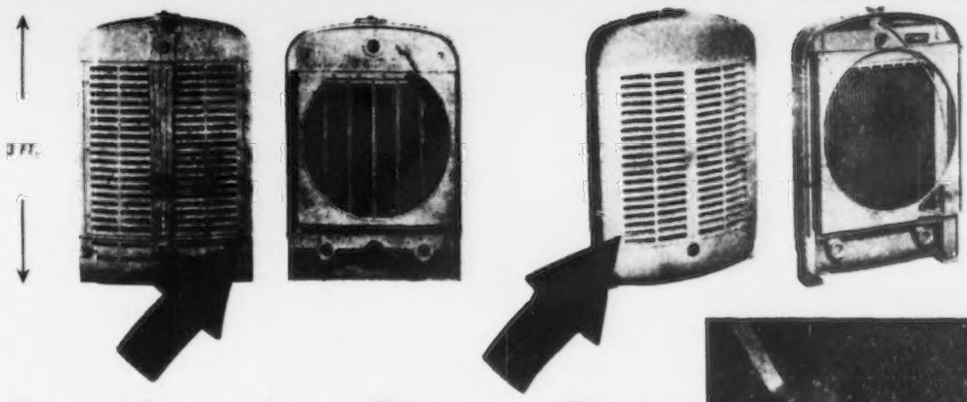
Gear Checker

A NEW system of measuring and checking spur and helical gears, known as the Gearmaster system, consists of a precision micrometer, and specially designed,

patented gear charts. Chordal measurements, tooth spacing, tooth thickness, diametral pitch, pressure angle, backlash allowance and pitch diameter can be determined in a single operation. *Urbauer Engineering Co.* Naperville, Ill.

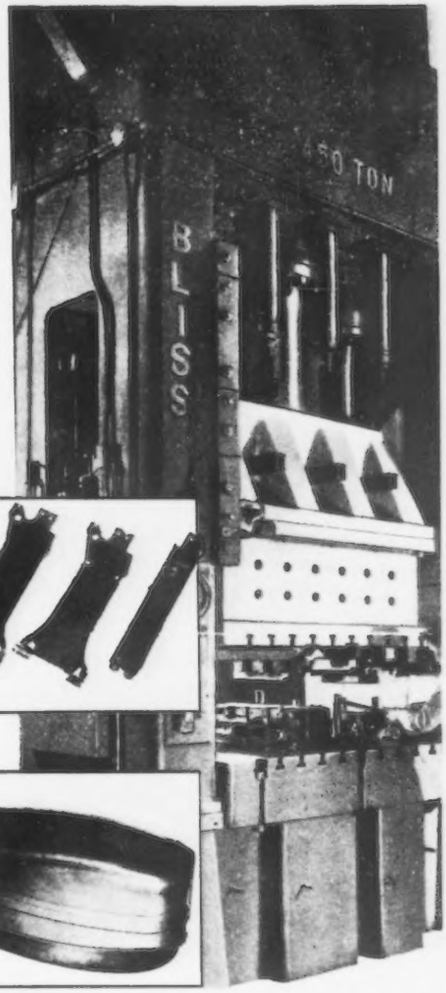
Optical Comparator

BENCH type optical comparators and measuring machines are available in two basic models with different table assembly combinations. The models are designed to cover almost unlimited field of inspection work. BC-7A, equipped with a 12-in. table, is used for comparing the magnified shadow of an object with a master outline, handling objects up to 3 in. diam. BC-7 B and C, with 14-in. and 16-in. tables respectively, can be compounded for inspecting objects with helices. Parts up to 3-in. diam and 11 in. long between centers can be inspected. The BC-14 model, with 14-in. diam screen, provides a larger lens field and screen area than the smaller models and has four table assembly combinations to



Casting-to-Stamping saves as much as 30% for Young Radiator Co.

450-Ton Bliss Hydraulic Press solves delivery, weight and durability problems



To achieve lighter, stronger and more cleanly designed radiators for automotive and industrial applications, the Young Radiator Company, of Racine, Wis., manufacturers of quality heat transfer equipment, recently converted the outside casings, tanks and side members from castings to formed steel parts. As it has consistently for 20 years, it chose Bliss to specify the press for the job. The resulting savings have been as much as 30%.

Today this 450-ton single-action hydraulic press is the pride of the plant. The weight of the radiators has been more than halved, and the drawn tanks provide as much cooling and are more durable than their cast counterparts. Besides the drawing of tank shells and housings, the press is used for forming operations on steel, aluminum and other metals.

Bliss, as it has for 90 years, did more than build a press. It provided the vital engineering knowledge for its maximum production. That's why 70% of Young's press equipment is Bliss-built...why President F. M. Young, who says, "We have long been advocates of Bliss presses and service," attributes much of the credit for his company's press production to Bliss engineering counsel.

This service and engineering counsel are at your disposal. You'll find, as Young Radiator Company has for more than two decades, that "Bliss" on your press is more than a name—it's a guarantee!

E. W. BLISS COMPANY, DETROIT 2, MICHIGAN

Mechanical and Hydraulic Presses, Rolling Mills, Container Machinery

WORKS AT: Toledo, Cleveland, Salem, Ohio; Hastings, Mich.; Englewood, N. J.; Derby, England; St. Ouen sur Seine, France • SALES OFFICES AT: Detroit, Hastings, Mich.; New York, Rochester, N. Y.; Cleveland, Dayton, Toledo, Salem, Ohio; Philadelphia, Pittsburgh, Pa.; Chicago, Ill.; New Haven, Conn.; Windsor, Ont.

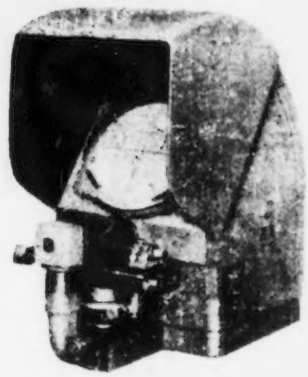
Feature of this Bliss Hydraulic Press which delights You is its extreme flexibility: use of the outside cylinders jobs up to 175 tons pressure; availability of full 450-pressure for heavier work, ability to accommodate center loads; quick advance and quick return; inch for die-setting and safety afforded by central push-but operation.

Above photo shows second and third forming ope tions of 18-gauge steel on radiator side members (in top). A third die will handle the initial piercing operati A Bliss hydraulic cushion ejects the stamping...this cu ion was previously used as a blankholder to draw the sh 7⅝" deep x 18" x 27" (inset, bottom), which is sub quently split in the center to form the top and bottom p of the radiator housings shown at heading of page.

BLISS BUILDS MORE TYPES AND SIZES OF PRESSES THAN ANY OTHER COMPANY

STAY AHEAD WITH *Bliss*

choose from, for inspection by comparison, and for inspecting objects with helices. BC-14 D, illustrated, used for the measurement of tools and products, has a 16-in. table with 2-in. lateral travel, and vertical elevation of 1¾ in. The chart



ring is graduated in degrees and minutes and the handwheel is graduated in 0.001. Objects up to 3 in. in diam and 11 in. long between centers may be inspected. *Jones & Lamson Machine Co.*, Springfield, Vt.

Three-Flute End Mill

REGULAR double end mills made with three cutting edges instead of the conventional two and four flute are said to have the operational advantages of hogging metal as fast as the two flute and leave the finish of the four flute. It cuts with a shearing action like the four flute but with no chatter of hammer. For die and mold work the operator can use one tool for both hogging and finishing. The insides of the flutes are ground to a high finish. Hook rake angles are designed to give maximum shearing action. The tool is made without the common center hole in the end which allows milling straight down in the work before starting the cut. *Cadillac Cutter Co.*, 1613 Eastern Ave. S.E., Grand Rapids 7, Mich.

Dial Snap Gage

THE framework of a new dial snap gage is machined from rolled magnesium, with angles at 45° to provide rigidity, and to minimize the dimensional changes caused by variations in temperature fluctuations. Another advancement featured in the gage is the use of a vernier type adjusting stud, which permits ¼-in. adjustments to be made in the gaging pin or movable anvil The adjustment can be

ARCOS ELECTRODES HAVE WHAT IS REQUIRED

- **FOR THE METAL FABRICATOR**—to weld stainless, chrome, chrome-nickel, inconel, monel, nickel, low-alloy high tensile steels, phosphor and Everdur bronzes.
- **FOR THE METALLURGIST**—to give a weld metal deposit that has been checked chemically and physically to meet the required metallurgical tests.
- **FOR THE SHOP SUPERINTENDENT**—to provide weld deposits that are consistently trouble-free which will result in high productivity.
- **FOR THE WELDER**—to handle easily, to make slag removal easy, and to give a good bead appearance with the right penetration.
- **FOR THE DESIGN ENGINEER**—to stand up in service against corrosion, high temperatures, pressure, abrasion, and cavitation in such an outstanding fashion that he can specify "Arcos" with assurance.
- **FOR THE PURCHASING AGENT**—to eliminate guess work. For stainless and alloy welding the Purchasing Agent will find that Arcos carries the most comprehensive line of *coated electrodes*, *bare wire* for acetylene or inert arc welding, and *coiled wire* for automatic welding in sizes from 3/64" to 1/4".

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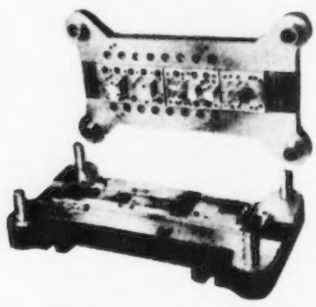
STAINLESS AND ALLOY WELDING ELECTRODES
and OXYARC PROCESS FOR CUTTING METALS

locked, with the gaging pin still remaining free for checking. This construction makes possible the use of a solid upper anvil block, which insures perfect parallelism at any setting throughout the entire range of the gage. To minimize friction and insure super-sensitivity, the use of a cam actuated rotary plunger, equipped with needle point bearings, is incorporated to transmit the travel from the gaging pin to the indicator. *Nilsson Gage Co.*, Poughkeepsie, N. Y.

Lamination Dies

A COMPLETE line of precision-made lamination dies are available for the manufacture of electric motors and other electrical parts. These dies are made to customers' specifications, or designed from part prints, and are held to dimensions as close as 0.0005 in. The seven-station progressive die shown is sectionally ground to exceedingly close tolerances and produces laminations for both rotor and stator parts of an electric motor. *Crescent Tool & Die Co.*, 1780 Southfield Rd., Lincoln Park 25, Mich.



Tracer

KNOWN as type GA, a Profilometer tracer for taking surface roughness measurements on the bottom of blind holes and on

recessed flats and shoulders, will measure in holes as small as 1-in. diam, at any depth to 5½ in. The diamond tracing point projects from the bottom of the tracer at the edge, and is self-adjusting to the

surface being measured. The tracer can be used with any Profilometer and is mechanically operated by means of a piloting fixture. This equipment obtains measurements on very smooth surfaces, 2 microinches and less. It is not recommended for use on surfaces rougher than 100 microinches. *Physicists Research Co.*, 321 S. Main St., Ann Arbor, Mich.

Stud Sets

STUD sets with a selection of T-nuts for 7/16, ½, 9/16, ⅝, 11/16, ¾, 13/16 and ⅞-in. table slotted machines are now available, each set consisting of six T-nuts, four coupling nuts, and four studs of each length 3, 4, 5, 6, 7 and 8 in. Lengths up to 15 in. may be attained with the aid of the coupling nuts provided. *Northwestern Tool & Engineering Co.*, Dayton 3.

Heating Torch

EIGHT hours' burning time, 3800°F operating flame and hand-size convenience are some of the features of the Crown Torch, a self-contained heating torch announced by *Sully Engineering, Ltd.*, 7416 Melrose Ave., Los Angeles, Calif. The torch, which burns Butane or Propane gas, is designed for soldering, brazing and heating operations. Made of 16 gage seamless brass tubing, the torch has a pressure capacity of 2200 psi. Operating pressure with Butane and Propane gases is 90 to 150 psi. It is 12 in. long, 2¼ in. in diam and weighs 2½ lb when full. Other features include fingertip control of flame size and temperature, and an all-in-one tip.

The Iron Age Metalworking Buyers' Guide

(CONTINUED)

D

WROUGHT WASHER MFG. CO., 2202 S. Bay St., Milwaukee 7.

Dies, Stamping

ALLEGHENY LUDLUM STEEL CORP., Brackenridge, Pa.

Atlas Metal Stamping Co., Castor Ave., Philadelphia.

Crucible Steel Co. of America, 405 Lexington Ave., New York 17.

Eastern Tool & Stamping Co., Inc., Saugus, Mass.

Federal Tool Corp., Leavitt St., Chicago.

South Bend Tool & Die Co., South Bend, Ind.

Steinen, Wm., Mfg. Co., 43 Bruen St., Newark 5, N. J.

Dies, Marking

Bloomfield Tool Corp., 35 Farrand St., Bloomfield, N. J.

Cadillac Stamp Co., Russell St., Detroit.

Force, Wm., A., & Co., 220 Nicholas Ave., Brooklyn.

MATTHEWS, Jas. H., & Co., 3954 Forbes Ave., Pittsburgh 13.

NOBLE & WESTBROOK MFG. CO., 22 Westbrook St., East Hartford 8, Conn.

Siewek Engineering Div., 211 Pearl St., Hartford, Conn.

Dies, Threading

HILL ACME CO., 4533 St. Clair Ave., Cleveland 2.

LANDIS MACHINE CO., Church & Fifth Sts., Waynesboro, Pa.

MURCHEY MACHINE & TOOL CO., 951 Porter St., Detroit 26.

NATIONAL ACME CO., 170 E. 131st St., Cleveland 8.

Oster Manufacturing Co., 2057 E. 61st Pl., Cleveland 3.

PRATT & WHITNEY DIV. NILES-BEMENT-POND CO., West Hartford 1, Conn.

Die Steels

Ajax Steel & Forge Co., 205 Adair St., Detroit 7.

ALLEGHENY LUDLUM STEEL CORP., Brackenridge, Pa.

Beals, McCarthy & Rogers, Inc., (Distributors), 50 Terrace, Buffalo 5.

BETHLEHEM STEEL CO., Bethlehem, Pa.

CARPENTER STEEL CO., 321 W. Bern St., Reading, Pa.

Colonial Steel Div., Vanadium-Alloys Steel Co., Latrobe, Pa.

CONTINENTAL FOUNDRY & MACH. CO., Grant Bldg., Pittsburgh 19.

CRUCIBLE STEEL CO. OF AMERICA, 405 Lexington Ave., New York 17.

HENRY DISSTON & SONS, INC., 219 Tacony, Philadelphia 35.

HEPPENSTALL CO., Hatfield St., Pittsburgh 1.

HOLLIDAY, W. J., & CO., Polk Blvd. & Wabash Ave., Hammond, Ind.

JESSOP STEEL CO., Washington, Pa.

SWEDISH AMERICAN STEEL CORP., 433 Kent Ave., Brooklyn 11.

TIMKEN ROLLER BEARING CO., Canton 6, Ohio.

WETHERELL BROS. CO., 251 Albany St., Cambridge, Mass.

Dies, Trimming

Congress Tool & Die Co., Collins Ave., Detroit.

Koch, Geo., & Sons, Inc., Ohio St., Evansville, Ind.

NIAGARA MACHINE & TOOL WORKS, Northland Ave., Buffalo 11.

Siewek Engineering Div., Pearl St., Hartford, Conn.

Steel Products Engineering Co., 1205 W. Columbia St., Springfield, Ohio.

Dilatometers

Bristol Instrument Co., Bristol Rd., Waterbury, Conn.

Buehler, A. I., Inc., La Salle St., Chicago.

Gaertner Scientific Corp., 1233 W. Wrightwood Ave., Chicago 14.

Thermal Syndicate Ltd., 12 E. 46th St., New York.

Dipping Tanks (see Tanks, Dipping)

Dischargers, High Pressure Drainage

Cochrane Corp., 17th St. & Allegheny Ave., Philadelphia 32.

Disintegraters, Metal

Clinton Machine Co., Clinton, Mich.

Detroit Extracter Co., 6900 Fenkell Ave., Detroit.

Drafto Corp., Cochranton, Pa.

Dolomite Machines

BLAW-KNOX CO., Farmers Bank Bldg., Pittsburgh.

Dolomite Refractories (see Refractories, Dolomite)

Doors, Rolling

Dodge, H. B., & Co., 335 S. Michigan Ave., Chicago.

Kinnear Mfg. Co., 750 Fields Ave., Columbus, Ohio.

Mahon, R. C., Co., 8725 Mt. Elliot Ave., Detroit

Moeschl-Edwards Corugating Co., P. O. Box 1115, Cincinati.

Wilson, J. G., Corp., 372 Lexington Ave., New York.

Dopes

DU PONT, E. I., DE NEMOURS & CO., INC., EXPLOSIVES DEPT., Wilmington 98, Del.

GLIDDEN CO., 11001 Madison Ave., Cleveland 2.

Standard Varnish Works, 2600 Richmond Terr., Port Richmond 3, S. I., N. Y.

Thompson & Co., 1085 Allegheny Ave., Oakmont, Pa.

Draglines (see Excavating Machines, Dragline)

Drainers, Cage, External and Internal

Cochrane Corp., 17th St. & Allegheny Ave., Philadelphia 32.

Draw Benches

AETNA-STANDARD ENGINEERING CO., 275 W. Federal St., Youngstown 1.

Cleveland Tool & Supply Co., 1427 W. 6th St., Cleveland 13.

Galbreath Machinery Co., (Used), Empire Bldg., Pittsburgh.

Indianapolis Machy. & Sup. Co., (Distributors), 1959-69 S. Meridian St., Indianapolis 6.

LAKE ERIE ENGINEERING CORP., Buffalo 17.

MESTA MACHINE CO., P. O. Box 1466, Pittsburgh 30.

Ritterbush & Co., Inc., 50 Church St., New York 7.

WATERBURY FARREL FOUNDRY & MACHINE CO., 453 Bank St., Waterbury 86, Conn.

West Pen Machinery Co., 1210 House Bldg., Pittsburgh 22.

WOOD, R. D., CO., Philadelphia, Pa.

Dredges, Hydraulic

Morris Machine Works, Baldwinsville, N. Y.

National Iron Co., Duluth, Minn.

Yuba Mfg Co., Balfour Bldg., San Francisco.

Dressers, Grinding Wheel

Beals, McCarthy & Rogers, Inc., (Distributors), 50 Terrace, Buffalo 5.

BOTWINIK BROS. OF MASS., INC., (Distributors), 5 Sherman St., Worcester 1, Mass.

CARBOLOY COMPANY, INC., 1153 E. 8-Mile Blvd., Detroit 32.

Cleveland Tool & Supply Co., 1427 W. 6th St., Cleveland 13.

Detroit-Star Grinding Wheel Co., 111-177 Cavalry Ave., N., Detroit 9.

DOALL CO., Minneapolis, Minn.

Golconda Diamond Products Corp., 3418-22 N. Knox Ave., Chicago 41.

Hanchett Manufacturing Co., Big Rapids, Mich.

Ideal Industries Inc., Sycamore, Ill.

J & S Tool Co., 477 Main St., E. Orange 9, N. J.

KOEBEL DIAMOND TOOL CO., 9456 Grinnell Ave., Detroit 13.

New England Carbide Tool Co., Inc., (IA), 60 Brookline St., Cambridge 39, Mass.

METAL CARBIDES CORP., 103 E. Indianola Ave., Youngstown 5.

Mid-West Abrasive Co., 500 S. Washington St. Owosso, Mich.

U. S. Grinding Wheel Co., 180 Lafayette St., New York 13.

U. S. Tool & Mfg. Co., P. O. Box 278, Dearborn, Mich.

VINCO CORP., 8881 Schaefer Highway, Detroit 27.

Wall-Colmonoy Corp., 714 Fisher Bldg., Detroit 2.

Westfield Grinding Wheel Co., Westfield, Mass.

Willey's Carbide Tool Co., 1340 West Vernor Highway, Detroit.

Drill Heads

Barnes Drill Co., Chestnut St., Rockford, Ill.

Bradford Machine Tool Co., Evans St., Cincinnati.

Buhr Machine Tool Co., 839 Greene St., Ann Arbor, Mich.

Cleveland Pneumatic Tool Co., 3785 E. 77th St., Cleveland.

EX-CELL-O-CORP., 1210 Oakman Blvd., Detroit 6.

KINGSBURY MACHINE TOOL CORP., Keene, N. H.

NATIONAL AUTOMATIC TOOL CO., Richmond, Ind.

Drilling and Tapping Machines, Combination

KINGSBURY MACHINE TOOL CORP., Keene, N. H.

Langelier Manufacturing Co., Providence 7, R. I.

BUYERS GUIDE

Drilling Machines, Bench Type

Ames, B. C., & Co., Waltham 54, Mass.

Avey Drilling Machine Co., P. O. Box 625, Cincinnati 1, Ohio.

Boice-Crane Co., Toledo 6, Ohio.

BUFFALO FORGE CO., 492 Broadway, Buffalo 4, N. Y.

Champion Blower & Forge Co., Lancaster, Pa.

Delta Mfg. Co., Milwaukee 1, Wis.

Hamilton Tool Co., Hamilton, Ohio.

Langelier Mfg. Co., Washington Ave., Providence, R. I.

LELAND-GIFFORD CO., 1025 Southbridge St., Worcester 1, Mass.

Production Machine Co., Greenfield, Mass.

Sigourney Tool Co., Cushman St., Hartford, Conn.

Drilling Machines, Deep Hole

BAKER BROS., INC., Post St., Toledo 10, Ohio.

Barnes, W. F., & John, Co., So. Water St., Rockford, Ill.

BAUSCH MACHINE TOOL CO., Springfield 7, Vt.

Kreuger, H. R., & Co., 1481 E. Grand Blvd., Detroit.

MOREY MACHINERY CO., INC., 410 Broome St., New York 13.

NATIONAL AUTOMATIC TOOL CO., Richmond, Ind.

PRATT & WHITNEY DIV., NILES-BEMENT-POND CO., West Hartford 1, Conn.

Drilling Machines, Heavy Duty

BAKER BROTHERS, INC., Station F, P. O. Box 101, Toledo 10, Ohio.

Barnes Co., W. F. & John, 301 S. Water St., Rockford, Ill.

Barnes Drill Co., 814-830 Chestnut St., Rockford, Ill.

Drilling Machines, Horizontal

Avey Drilling Machine Co. Works, Covington, Ky., P. O., Cincinnati 1.

Cincinnati Gilbert Mach. Tool Co., 3366 Beekman St., Cincinnati 23.

CONSOLIDATED MACHINE TOOL CORP., Rochester 10, N. Y.

Foote-Burt Co., 13000 St. Clair Ave., Cleveland 8.

Giddings & Lewis Mach. Tool Co., Fond du Lac, Wis.

Lucas Machine Tool Co., E. 99th St. & N.Y.C. R.R., Cleveland 8.

MOLINE TOOL CO., 100 20th St., Moline, Ill.

Ohio Machine Tool Co., S. Leighton St. & Erie Railway, Kenton, Ohio.

SELLERS, WILLIAM, & CO. INC., 1600 Hamilton St., Philadelphia 30.

Universal Boring Machine Co., 312 Main St., Hudson, Mass.

Drilling Machines, Multiple Spindle

Avey Drilling Machine Co., Third St., Cincinnati.

BAKER BROS., INC., Toledo.

Barnes, W. F. & John, Co., 301 S. Water St., Rockford, Ill.

Barnes Drill Co., Rockford, Ill.

Baush Machine Tool Co., 156 Wason Ave., Springfield 7, Vt.

Bodine Corp., 317 Mountain Grove St., Bridgeport 5, Conn.

BUFFALO FORGE CO., 492 Broadway, Buffalo 5.

Canedy Otto Mfg. Co., Chicago Heights, Ill.

CINCINNATI BICKFORD TOOL CO., Oakley, Cincinnati 9.

Cleereman Machine Tool Co., Green Bay, Wis.

• Every company in the metalworking industry is urged to check this section of the new IRON AGE Metalworking Buyers' Guide, and send in corrections and additions to assure complete accuracy in the first reprint of the directory. Forward corrections to THE IRON AGE, Attention Buyers' Directory, 100 E. 42nd St. New York 17.

Coastal Machine Works, Inc., Bridgeport, Conn.

CONSOLIDATED MACHINE TOOL CORP., Rochester 10, N. Y.

Edlund Machinery Co. Inc., Cortland, New York.

EX-CELL-O CORP., 1200 Oakman Blvd., Detroit 6.

Foote-Burt Co., 13000 St. Clair Ave., Cleveland 8.

Gray, G. A., Co., 3611 Woodburn Ave., Cincinnati 7.

Hoefer Mfg. Co., Ind., Freeport, Ill.

LELAND-GIFFORD CO., 1025 Southbridge St., Worcester 1, Mass.

MOLINE TOOL CO., 102 Twentieth St., Moline, Ill.

NATIONAL AUTOMATIC TOOL CO. INC., S. 7th & N. Sts., Richmond, Ind.

PRATT & WHITNEY, DIV. NILES-BEMENT-POND CO., West Hartford 1, Conn.

Sommerfeld Machine Co., 210 Corey Ave., Braddock, Pa.

Thomas Machine Mfg. Co., Butler Rd., Pittsburgh.

Drilling Machines, Radial

American Tool Works Co., Alter St., Cincinnati.

BAUSH MACHINE TOOL CO., Springfield 7, Vt.

Canedy-Otto Mfg. Co., 95 Thomas St., Chicago Heights, Ill.

Carlton Machine Tool Co., Spring Grove Ave., Cincinnati 25.

CINCINNATI BICKFORD TOOL CO., Oakley, Cincinnati 9.

Cincinnati-Gilbert Machine Tool Co., 3366 Beekman St., Cincinnati 23.

CONSOLIDATED MACHINE TOOL CORP., Rochester 10, N. Y.

Dauber Co., Marion St., Oshkosh, Wis.

Foote-Burt Machine Co., 13000 St. Clair Ave., Cleveland 8.

FOSDICK MACHINE TOOL CO., Blue Rock St., Cincinnati 23.

Hazard Brownell Machine Tools, Inc., 350 Waterman St., Providence 6.

Morris Machine Tool Co., Court & Harriet St., Cincinnati 3.

Onsrud Machine Works, Palmer St., Chicago 47.

SELLERS, WM., & CO., Hamilton St., Philadelphia.

SNYDER TOOL & ENGINEERING CO., 3400 E. Lafayette Ave., Detroit 7.

WALKER TURNER CO., INC., Plainfield, N. J.

Western Machine Tool Works, Holland, Mich.

Drilling Machines, Sensitive and Upright

Allen, Charles G., Co., Barre, Mass.

Avey Drilling Machine Co., Cincinnati 1.

BAKER BROS., INC., Toledo 10, Ohio.

Boice-Crane Co., Toledo 6, Ohio.

BRYANT MACHINERY & ENGINEERING CO., 400 W. Madison St., Chicago 6.

BUFFALO FORGE CO., 492 Broadway, Buffalo 4, N. Y.

Canedy-Otto Mfg. Co., 90 Thomas St., Chicago Heights, Ill.

Champion Blower & Forge Co., Lancaster, Pa.

CINCINNATI BICKFORD TOOL CO., 3250 Farrer St., Cincinnati 9.

Defiance Machine Works, Inc., Defiance, Ohio.

Delta Mfg. Co., Milwaukee 1, Wis.

Edlund Machinery Co., Inc., Cortland St., New York.

Foote-Burt Co., 13000 St. Clair Ave., Cleveland 8.

FOSDICK MACHINE TOOL CO., Blue Rock St., Cincinnati 23.

Haskins, R. G., & Co., 2735 W. Flournoy St., Chicago 12.

HENRY & WRIGHT MFG. CO., 790 Windsor St., Hartford 1, Conn.

LELAND-GIFFORD CO., Lincoln Highway, Worcester, Mass.

Royersford Foundry, Deisher St., Royersford, Pa.

SIBLEY MACHINE & FOUNDRY CORP., 206 E. Tutt St., South Bend 23, Ind.

Sigourney Tool Co., Cushman St., Hartford, Conn.

Taylor & Fenn Co., 54 Arch St., Hartford 1.

Taylor Mfg. Co., Milwaukee 10.

WALKER TURNER CO., Plainfield, N. J.

Drilling Machines, Way and Special

BAKER BROS., INC., Port St., Toledo 10, Ohio.

Barnes Drill Co., Chestnut St., Rockford, Ill.

Barnes, W. F. & John, Co., S. Water St., Rockford, Ill.

BAUSH MACHINE TOOL CO., Springfield 7, Vt.

Bodine Corp., Mountain Grove St., Bridgeport 5, Conn.

Bradford Machine Tool Co., Evans St., Cincinnati 4.

Buhr Machine Tool Co., Ann Arbor, Mich.

CONSOLIDATED MACHINE TOOL CORP., Rochester 10, N. Y.

Davis & Thompson Co., W. Burnham St., Milwaukee 14.

EX-CELL-O CORP., Oakman Blvd., Detroit 6.

FARNHAM MFG. CO., Elk St., Buffalo 10, N. Y.

Foote-Burt Co., St. Clair Ave., Cleveland 8.

Fox Engineering Co., Jackson, Mich.

Gear Grinding Machine Co., Christopher St., Detroit 11.

Globe Tapping Machine Co., Central Ave., Bridgeport 7.

GREENLEE BROS. & CO., 1809 Mason Ave., Rockford, Ill.

Hopkins Machine Corp., 4250 W. Diversay Ave., Chicago.

Kaufman Mfg. Co., S. 29th St., Manitowoc, Wis.

Kent Machine Co., Cuyahoga Falls, Ohio.

Keystoe Cnrankshaft & Machine Tool Co., Bacon St., Erie, Pa.

KINGSBURY MACHINE TOOL CORP., Keene, N. H.

Krueger, H. R., & Co., 1485 E. Grand Blvd., Detroit.

Langelier Mfg. Co., Washington Ave., Providence, R. I.

Le Maire Tool Co., 2650 S. Telegraph Rd., Dearborn, Mich.

MOLINE TOOL CO., 100 20th St., Moline, Ill.

Morton Mfg. Co., Broadway, Muskegon Heights, Mich.

NATIONAL AUTOMATIC TOOL CO., Richmond, Ind.

Providence Engineering Co., Main St., Providence, R. I.

Rehnberg-Jackobson Mfg. Co., Rockford, Ill.

SNYDER TOOL & ENGINEERING CO., 3400 E. Lafayette Ave., Detroit.

Drill Presses

Aaron Machinery Co., Inc., 45 Crosby St., New York 12.

Atlas Press Co., 1909 N. Pitcher St., Kalamazoo 13, Mich.

Avey Drilling Machine Co., P. O. Box 625, Cincinnati 1.

Beals, McCarthy & Rogers, Inc. (Distributors), 50 Terrace, Buffalo 5.

Boice-Crane Co., 930 W. Central St., Toledo 6.

BOTWINIK BROS. OF MASS, INC. (DISTRIBUTORS), 5 Sherman St., Worcester 1.

BRYANT MACHINERY & ENGINEERING CO., 400 W. Madison St., Chicago 6.

CINCINNATI BICKFORD TOOL CO., Oakley, Cincinnati 9, Ohio.

Cincinnati Gilbert Machine Tool Co., 3360 Beekman St., Cincinnati 23.

Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.

Cleerman Machine Tool Co., Green Bay, Wis.

CONSOLIDATED MACHINE TOOL CORP., 565 Blossom Rd., Rochester 10, N. Y.

Davis & Thompson Co., 6411 W. Burnham St., Milwaukee 14.

Delta Manufacturing Co., 620 E. Vienna Ave., Milwaukee 1, Wis.

Donahue Steel Products Co., Inc., 1919 W. 74th St., Chicago 36.

DUMORE CO., 506 14th St., Racine, Wis.

FOSDICK MACHINE TOOL CO., Blue Rock & Apple Sts., Cincinnati 23.

Galbreath Machinery Co. (Used), Empire Bldg., Pittsburgh.

General Machinery Corp., Hooven, Owens, Rentschler Div., Hamilton, Ohio.

General Machinery & Equipt. Co., 180 S. 15th St., Harrisburg, Pa.

Gray, G. A., Co., 3611 Woodburn Ave., Cincinnati 7.

Hazard Brownell Machine Tools, Inc., 250 Waterman St., Providence 6.

High Speed Hammer Co., Inc., 313 Norton St., Rochester 5, N. Y.

Hill-Clarke Machinery Co., 648 W. Washington Blvd., Chicago 6.

Hoefer Mfg. Co., Inc., Freeport, Ill.

Indianapolis Machy. & Sup. Co. (Distributors), 1959-69 S. Meridian St., Indianapolis 6.

Hamilton Tool Co., Hamilton, Ohio.

R. G. Haskins Co., 615 S. California Ave., Chicago 12, Ill.

HENRY & WRIGHT MFG. CO., 790 Windsor St., Hartford 1, Conn.

Interstate Machinery Co., 1435 W. Pershing Rd., Chicago 9.

Langelier Mfg. Co., Providence 7.

LELAND-GIFFORD CO., Worcester.

Machinery Liquidating Co., 2306 W. Warren Ave., Detroit 8.

Miles Machinery Co., 2025 E. Genesee Ave., Saginaw, Mich.

Onsrud Machine Works, Inc., 3900 Palmer St., Chicago 47.

Royersford Foundry & Machine Co., Inc., Main St., Royersford, Pa.

SIBLEY MACHINE & FDRY. CORP., 206 E. Tutt St., South Bend 23, Ind.

Simmons Machine Tool Corp., Albany 1.

SUNDSTRAND MACHINE TOOL CO., 2539 Eleventh St., Rockford, Ill.

West Penn Machinery Co., 1210 House Bldg., Pitsburgh 22.

Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh 23.

WALKER-TURNER CO., INC., Plainfield, N. J.

Drill Rod

AMERICAN STEEL & WIRE CO., Rockefeller Bldg., Cleveland 13.

Baron Steel Co., 4075 Detroit Ave., Toledo 12.

Beals, McCarthy & Rogers, Inc. (Distributors), 50 Terrace, Buffalo 5.

Brown-Wales Co., 493 C St., Boston 10.

CARPENTER STEEL CO., 321 W. Bern St., Reading, Pa.

CENTRAL STEEL & WIRE CO., 3000 W. 51st St., Chicago 32.

Cleveland Tool & Supply Co., 1427 W. 6th St., Cleveland 13.

Colonial Steel Div., Vanadium-Alloys Steel Co., Latrobe, Pa.

Crucible Steel Co. of America, 405 Lexington Ave., New York 17.

Eastern Tool Supply Co., 176 Grand St., New York 13.

Hoyland Steel Co., Inc., 405 Lexington Ave., New York 17.

HOLLIDAY, W. J., & CO., Polk Blvd. & Wabash Ave., Hammond, Ind.

Indianapolis Machinery & Sup. Co. (Distributors), 1959-69 S. Meridian St., Indianapolis 6.

JESSOP STEEL CO., Washington, Pa.

Joy Manufacturing Co., Sullivan Div., Michigan City, Ind.

SANDVIK STEEL, INC., 111 8th Ave., New York 11.

Steel Sales Corp., 3352 S. Pulaski Rd., Chicago 23.

SWEDISH AMERICAN STEEL CORP., 433 Kent Ave., Brooklyn 11.

Uddeholm Company of America, Inc., 155 E. 44th St., New York 17.

UNITED STATES STEEL SUPPLY CO., 1319 Wabansia Ave., Chicago 90.

Ward Steel Co., 44 Farnworth St., Boston 10.

Drills, Hand Electric

Beals, McCarthy & Rogers, Inc., (Distributors), 50 Terrace, Buffalo 5.

BLACK & DECKER MFG. CO., Towson, Baltimore 4.

BOTWINIK BROS. OF MASS. INC., 5 Sherman St., Worcester 1.

Chicago Pneumatic Tool Co., 8 E. 44th St., New York 17.

Cleveland Tool & Supply Co., 1427 W. 6th St., Cleveland 13.

Eastern Tool Supply Co., 176 Grand St., New York 13.

Foote-Burt Co., 13000 St. Clair Ave., Cleveland 8.

FOSDICK MACHINE TOOL CO., Blue Rock & Apple Sts. Cincinnati 23.

Galbreath Machinery Co., (used), Empire Bldg., Pittsburgh.

Indianapolis Machinery & Sup Co., (Distributors), 1959-69 S. Meridian St., Indianapolis 6.

Interstate Cachinery Co., 1435 W. Persoing Rd., Chicago 9.

Joy Manufacturing Co., Sullivan Division, Michigan City, Ind.

Kaukauna Machine Corp., Kaukauna, Wis.

Mall Tool Co., 7801 S. Chicago Ave., Chicago 19.

STANLEY WORKS, Stanley Electric Tools Div., New Britain, Conn.

U. S. ELECTRICAL TOOL CO., 1050 Findlay St., Cincinnati 14.

UNITED STATES STEEL SUPPLY CO., 1319 Wabansia Ave., Chicago 90.

Drills, Pneumatic

Arrow Expansion Bolt Co., 300 Boone Ave., Marion, Ohio.

BOTWINIK BROS. OF MASS. INC., 5 Sherman St., Worcester 1.

Chicago Pneumatic Tool Co., 8 E. 44th St., New York 17.

Cleveland Pneumatic Tool Co., 3781 E. 77th St., Cleveland 5.

Cleveland Tool & Supply Co., 1427 W. 6th St., Cleveland 13.

Gardner-Denver Co., 100 Williamson St., Quincy, Ill.

Ideal Industries, Inc., Sycamore, Ill.

Ingersoll-Rand Co., 11 Broadway, New York 4.

Interstate Machinery Co., 1435 W. Pershing Rd., Chicago 9.

Joy Mfg. Co., Sullivan Div., Michigan City, Ind.

ROTOR TOOL CO., 17325 Euclid Ave., Cleveland 12.

SWEDISH AMERICAN STEEL CORP., 433 Kent Ave., Brooklyn 11.

Drills, Twist

Beals, McCarthy & Rogers, Inc., (Distributors), 50 Terrace, Buffalo 5.

Carboloy Company, Inc., 11153 E. 8-Mile Blvd., Detroit 32.

CHICAGO LATROBE TWIST DRILL WKS., 411 W. Ontario St., Chicago 10.

Cleveland Tool & Supply Co., 1427 W. 6th St., Cleveland 13.

CLEVELAND TWIST DRILL CO., 1246 E. 49th St., Cleveland 14.

Cogsdill Twist Drill Co., 6511-15 Epworth Blvd., Detroit 10.

Eastern Tool Supply Co., 176 Grand St., New York 13.

Indianapolis Machinery & Sup. Co., (Distributors), 1959-69 S. Meridian St., Indianapolis 6.

Melin Tool Co. Inc., 1331 Phillips, S. W., Grand Rapids 7.

National Machine & Tool Co., 626 N. Mechanic Street, Jackson, Mich.

New England Carbide Tool Co., Inc., (IA), 60 Brookline St., Cambridge 39, Mass.

PRATT & WHITNEY DIV., NILES-BEMENT-POND CO., West Hartford 1, Conn.

Threadwell Tap & Die Co., Greenfield, Mass.

Union Twist Drill Co., Athol, Mass.

U. S. Tool & Mfg. Co., P. O. Box 278, Dearborn.

Warren Industries, 8552 16 Mile Road, Warren, Ohio.

WHITMAN & BARNES, DIV OF UNITED DRILL & TOOL CORP., Detroit 16.

Willey's Carbide Tool Co., 1450 West Venor Highway, Detroit.

Drives, Heavy Duty

FARREL-BIRMINGHAM CO., INC., Ansonia, Conn. & 344 Vulcan St., Buffalo 7, N. Y.

Drives, Machine Tool

DODGE MFG. CORP., Mishawaka, Ind.

Drive-All Mfg. Co., 3400 Connor Ave., Detroit 14.

Given Machinery Co., Santa Fe Ave., Los Angeles.

Link-Belt Co., Pershing Rd., Chicago.

MASTER ELECTRIC CO., INDUSTRIAL EQUIPMENT DIV., 126 Davis Ave., Dayton 1.

Drives, Motor, Variable Speed

ALLIS-CHALMERS MFG. CO., 1130 S. 70th St., Milwaukee 1.

HENDRICK MFG. CO., 37 Dundaff St., Carbondale, Pa.

Howe Manufacturing Co., 7500 Euclid Ave., Cleveland 3.

MASTER ELECTRIC CO., Industrial Equipment Div., 126 Davis Ave., Dayton 1.

REEVES PULLEY CO., Columbus, Ind.

RELIANCE ELECTRIC & ENGINEERING CO., 1083 Ivanhoe Rd., Cleveland 10.

Western Manufacturing Co., 3428 Scotten Ave., Detroit 10.

Drives, V-Belt

Continental Gin Co., Birmingham.

Dayton Rubber Mfg. Co., 2345 Riverview Ave., Dayton 1.

DODGE MANUFACTURING CORP., Mishawaka, Ind.

Link-Belt Co., Pershing Rd., Chicago.

Drop Forgings (see Forgings, Drop, Specific Types)

Drums, Rubber Insulated

B. F. GOODRICH CO., INDUSTRIAL PRODUCTS DIV., Akron 18, Ohio.

U. S. RUBBER CO., 1230 Avenue of the Americas, New York 20.

U. S. STONEWARE CO., PROCESS EQPT. DIV., P. O. Box 350, Akron, Ohio.

Dryers, Rotary

ALLIS-CHALMERS MFG. CO., Milwaukee 1.

Buflovak Equipment Div. of Blaw-Knox Co., Winchester Ave., Buffalo 11.

Link-Belt Co., Pershing Rd., Chicago 9.

McCrosky Tool Corp., Meadville, Pa.

Pennsylvania Engineering Corp., New Castle, Pa.

Struthers-Wells Corp., Warren, Pa.

Drying Machines

Beam-Knodel Co., 195 Lafayette St., New York 12.

Bartlett, C. O., & Snow Co., 6200 Harvard Ave., Cleveland 5.

Continental Industrial Engineers, Inc., 176 W. Adams St., Chicago 3.

Crown Rheostat & Supply Co., 3465 N. Kimball Ave., Chicago 18.

Despatch Oven Co., 613-23 S.E. 8th St., Minneapolis 14.

Drying Systems, Inc., 1825 Foster Ave., Chicago 40.

METALWASH MACHINERY CO., 149 Shaw Ave., Irvington 11, N. J.

Milwaukee Metal Spinning Co., 4122 W. State St., Milwaukee 8.

OPTIMUS EQUIPMENT CO., 7 Water St., Matawan, N. J.

Tolhurst Centrifugals Div., American Machine & Metals, Inc., East Moline, Ill.

Wagner Litho Machine Div., National Standard Co., Harborside Terminal, Unit 3, Jersey City 2, N. J.

Rockwell, W. S., Co., 200 Eliot St., Fairfield, Conn.

Dumbwaiters, Electric Powered

Otis Elevator Co., 260 11th Ave., New York 1.

Service Caster & Truck Corp., Albion, Mich.

Duplicating Machines, Metal

Aaron Machinery Co., Inc., 45 Crosby St., New York 12.

CINCINNATI MILLING & GRINDING MACHINES, Marburg St., Cincinnati 9.

Coulter, James, Machine Co., Railroad Ave., Bridgeport 5, Conn.

FARNHAM MFG. CO., Senica St., Buffalo 10, N. Y.

Fitchburg Engineering Corp., Fitchburg, Mass.

Frew Machine Co., 118 E. Luray St., Philadelphia.

Gorton, George, Machine Co., 1111 W. 13th St., Racine, Wis.

Kearney & Trecker Corp., 6791 W. National Ave., Milwaukee 14.

Le Maire Tool Co., 2665 S. Telegraph Rd., Dearborn, Mich.

MOREY MACHINERY CO., 410 Broome St., New York 13.

PRATT & WHITNEY DIV., NILES-BEMENT-POND CO., West Hartford 1, Conn.

REED-PRENTICE CORP., 667-677 Cambridge St., Worcester 4, Mass.

Rowbottom Machine Co., Archer St., Waterbury, Conn.

BUYERS GUIDE

Electric Heating Elements

CUTLER-HAMMER, INC., 1262 St. Paul Ave., Milwaukee 1.

Driver-Harris Co., P. O. Box #31, Harrison, N. J.

Globar Div. Products, Carborundum Co., Niagara Falls, N. Y.

HOSKINS MANUFACTURING CO., 4445 Lawton Ave., Detroit 8.

Vulcan Corp., 1701 Arch St., Philadelphia 3

Watlow Electric Mfg. Co., 1320 N. 23rd St., St. Louis 6.

WESTINGHOUSE ELECTRIC CORP., P. O. Box 868, East Pittsburgh, Pa.

Electric Resistance Heaters

CUTLER-HAMMER, INC., 1262 St. Paul Ave., Milwaukee 1.

Precision Welder & Machine Co., 138 E. McMicken Ave., Cincinnati 10.

Rockwell, W. S., Co., 200 Eliot St., Fairfield, Conn.

Sunbeam Stewart Ind. Fnc. Div., Sunbeam Corporation, 4433 W. Ogden Ave., Chicago 23.

Swift Electric Welder Co., 6560 Epworth Blvd., Detroit 10.

WESTINGHOUSE ELECTRIC CORP., P. O. Box 868, East Pittsburgh, Pa.

Electric Wiring Supplies

ALLIED ELECTRIC PRODUCTS, INC., Irvington, N. J.

DOW CORNING CORP., Midland, Mich.

PIERCE RENEWABLE FUSES, INC., Buffalo, N. Y.

Electrical Alloys

CARPENTER STEEL CO., 321 W. Bern St., Reading, Pa.

Columbia Steel Co., Russ Bldg., San Francisco 6.

Driver-Harris Co., P. O. Box #31, Harrison, N. J.

HOSKINS MANUFACTURING CO., 4445 Lawton Ave., Detroit 8.

MALLORY, P. R., & CO., INC., 3029 E. Washington St., Indianapolis 6, Ind.

Metal Hydrides, Inc., 16 Congress St., Beverly, Mass.

REVERE COPPER AND BRASS INC., 230 Park Ave., New York 17.

WESTINGHOUSE ELECTRIC CORP., P. O. Box 868, East Pittsburgh, Pa.

Electrical Control Equipment

ALLIS-CHALMERS MFG. CO., 1130 S. 70th St., Milwaukee 1.

BULLDOG ELECTRIC PRODUCTS CO., Box 177, Roosevelt Park Annex, Detroit 32, Mich.

CLARK CONTROLLER CO., 1146 E. 152nd St., Cleveland 10.

CUTLER-HAMMER, INC., 1262 St. Paul Ave., Milwaukee 1.

ELECTRIC CONTROLLER & MFG. CO., 2698 E. 79th St., Cleveland 4.

MASTER ELECTRIC CO., Dayton 1, Ohio.

SQUARE D CO., Rivard St., Detroit 11.

WESTINGHOUSE ELECTRIC CORP., P. O. Box 868, E. Pittsburgh, Pa.

Electrical Resistors

Allen-Bradley Co., 136 W. Greenfield Ave., Milwaukee 4.

Beam-Knodel Co., 195 Lafayette St., New York 12.

CUTLER-HAMMER, INC., 1262 St. Paul Ave., Milwaukee 1.

Driver-Harris Co., P. O. Box 31, Harrison, N. J.

BUYERS GUIDE

Globar Div. Products, Carborundum Co., Niagara Falls, N. Y.

HOSKINS MANUFACTURING CO., 4445 Lawton Ave., Detroit 8.

Keystone Carbon Co. Inc., 1935 State St., St. Mary's, Pa.

LEEDS & NORTHRUP CO., 4956 Stenton Ave., Philadelphia 44.

MALLORY, P. R., & CO., INC., 3029 E. Washington St., Indianapolis 6, Ind.

Ohmite Manufacturing Co., 4835 Flournoy St., Chicago 44.

Stackpole Carbon Co., St. Marys, Pa.

Westinghouse Electric Corp., P. O. Box 868, East Pittsburgh 22.

Electrocleaners, Metal

Apothecaries Hall Co., Waterbury, Conn.

Cowles Detergent Co., 7020 Euclid Ave., Cleveland.

HANSON-VAN WINKLE-MUNNING CO., Church St., Matawan, N. J.

Harshaw Chemical Co., 1939 E. 97th St., Cleveland.

OAKITE PRODUCTS, INC., 30 Thames St., New York 6.

Rumford Chemical Works, Rumford, R. I.

Turco Products Inc., 48th & Halstead Sts., Chicago.

UDYLITE CORP., Detroit 11.

Westvaco Chlorine Products Corp., Chrysler Bldg., New York.

WYANDOTTE CHEMICALS CORP., Wyandotte, Mich.

Electrode Holders, Welding

Allied Weld-Craft, Inc., 401 W. South St., Indianapolis 4, Ind.

ALLIS-CHALMERS MFG. CO., 1126 So. 70th St., Milwaukee 1.

ARCOS CORPORATION, 1515 Locust St., Philadelphia.

Brown-Wales Co., 493 C St., Boston 10.

CHAMPION RIVET CO., Harvard Ave. & E. 108th St., Cleveland 5.

Commerce Pattern Foundry & Machine Co., 7450 Melville Ave., Detroit 17.

Electric Arc, Inc., 152 Jelliff St., Newark 8, N. J.

HARNISCHFEGER CORP., 4401 W. National Ave., Milwaukee 14.

Hollup Corporation, 4700 W. 19th St., Chicago 50.

LINCOLN ELECTRIC CO., Dept. 149, Coit Road & Kirby Ave., Cleveland 1.

MALLORY, P. R., & CO., 3029 E. Washington Ave., Indianapolis 6, Ind.

Marquette Mfg. Co., Inc., 307 E. Hennepin St., Minneapolis 14.

Electrode Holders, Welding

METAL & THERMIT CORP., 120 Broadway, New York 5.

NATIONAL CYLINDER GAS CO., 840 N. Michigan Ave., Chicago 4.

Rail Supply Co., 110 E. 42nd St., New York 17.

Steel Sales Corp., 3352 S. Pulaski Rd., Chicago 23.

Universal Power Corp., 769 Carnegie Ave., Cleveland 15.

WESTINGHOUSE ELECTRIC CORP., P. O. Box 868, East Pittsburgh, Pa.

Electrodes, Electric Furnace

AJAX ELECTRIC CO., INC., Division of the Ajax Metal Co., 955 Frankford Ave., Philadelphia 23.

Brown-Wales Co., 493 C St., Boston 10.

BUYERS GUIDE

SNYDER TOOL & ENGINEERING CO., 3418 E. Lafayette Ave., Detroit 7.

SUNDSTRAND MACHINE TOOL CO., 2539 Eleventh St., Rockford 2, Ill.

Thompson, Earl A., Co., Ferndale, Mich.

VAN NORMAN MACHINE TOOL CO., 3594 Main St., Springfield 7, Mass.

Dust Collectors and Control Systems

Aget-Detroit Co., 637 First National Bldg., Ann Arbor, Mich.

American Foundry Eqpt. Co., Inc., 412 S. Byrkit St., Mishawaka, Ind.

BOTWINIK BROS. OF MASS., INC. (Distributors), 5 Sherman St., Worcester 1.

BREUER ELECTRIC MFG. CO., 5100 N. Ravenswood Ave., Chicago 40.

Edward Blake Co., 634 Commonwealth Ave., Newton Centre 59, Mass.

Falstrom Co., Main Ave. & D. L. & W. R.R., Passaic, N. J.

Indianapolis Machinery & Sup. Co. (Distributors), 1959-69 S. Meridian St., Indianapolis 6.

KOPPERS COMPANY, INC., Koppers Bldg., Pittsburgh 19.

Parsons Engineering Corp., 2549 E. 79th St., Cleveland 4.

Robinson Ventilating Co., Zelienople, Pa.

RUEMELIN MFG. CO., 3870 Palmer St., Milwaukee 12.

SCHMIEG INDUSTRIES, INC., 296 Piquette St., Detroit 2.

SCHENEIBLE, CLAUDE B., CO., Detroit.

Torit Manufacturing Co., Walnut & Exchange Sts., St. Paul 2.

United States Hoffman Machinery Corp., 105 Fourth Ave., New York 5.

WESTINGHOUSE ELECTRIC CORP., P. O. Box 868, East Pittsburgh, Pa.

WHITING CORP., Harvey, Ill.

Dynamometers

Clayborne Manufacturing Co., 209 S. LaSalle St., Chicago 4.

Dillon, W. C., & Co., Inc., 5400 W. Harrison St., Chicago 44.

Electric Products Co., 1725 Clarkstone Rd., Cleveland 12.

GENERAL ELECTRIC CO., Schenectady 5.

WESTINGHOUSE ELECTRIC CORP., P. O. Box 868, East Pittsburgh.

Commerce Pattern Foundry & Machine Co., 7450 Milville St., Detroit 17.

Driver-Harris Co., P. O. Box 31, Harrison, N. J.

Electric Arc, Inc., 152 Jelliff St., Newark 8, N. J.

Eutectic Welding Alloys Corp., 40 Worth St., New York 13.

HARNISCHFEGER CORP., 4401 W. National Ave., Milwaukee 14.

Hollup Corp., 4700 W. 19th St., Chicago 50.

Indianapolis Machinery & Supply Co., (Distributors), 1959 S. Meridan St., Indianapolis 6, Ind.

JESSOP STEEL CO., Washington, Pa.

Le Tourneau, R. G., Co., Peoria, Ill.

LINCOLN ELECTRIC CO., Dept. 149, Coit Rd., Cleveland 1.

MALLORY, P. R., & CO., INC., 3029 E. Washington St., Indianapolis 6, Ind.

Marquette Mfg. Co., Inc., 307 E. Hennepin St., Minneapolis 14.

METAL & THERMITE CORP., 120 Broadway, New York 5.

NATIONAL CYLINDER GAS CO., 840 N. Michigan Ave., Chicago 11.

National Electric Welding Machines Co., 1846 N. Trumbull St., Bay City, Mich.

PAGE & STEEL WIRE DIV., AMERICAN CHAIN & CABLE CO., INC., Monessen, Pa.

BUYERS GUIDE

United States Graphite Co., Saginaw, Mich.

UNITED STATES STEEL SUPPLY CO., 1319 Wabansia Ave., Chicago 90.

Universal Power Corp., 769 Carnegie Ave., Cleveland 15.

WESTINGHOUSE ELECTRIC CORP., P. O. Box 868, East Pittsburgh, Pa.

Weiger, Weed & Co., 11644 Cloverdale Ave., Detroit 4.

Electroplating Chemicals (See Chemicals, Electroplating)

Electroplating Equipment

Beam-Knodel Co., 195 Lafayette St., New York 12.

Columbia Electric Mfg. Co., 4519 Hamilton Ave., Cleveland 14.

Crown Rheostat & Supply Co., 3465 N. Kimball Ave., Chicago 18.

Daniels Plating Barrel Co., 129 Oliver St., Newark, N. J.

Electric Products Co., 1725 Clarkstone Rd., Cleveland 12.

Enthone, Inc., 442 Elm St., New Haven 11, Conn.

Stevens, Frederic B., Inc., 510 Third St., Detroit 26.

Galbreath Machinery Co., (Distributors), Empire Bldg., Pittsburgh.

Nankervis, Geo. L., Co., 5442 Second Blvd., Detroit 2.

HANSON-VAN WINKLE-MUNNING CO., Matawan, N. J.

Heil Process Equipment Corp., 12901 Elmwood Ave., Cleveland 11.

MacDERMID, INC., Waterbury, Conn.

MESTA MACHINE CO., P. O. Box 1466, Pittsburgh 30.

Puritan Mfg. Co., Waterbury, Conn.

Sommers Bros. Mfg. Co., 3439 N. Broadway, St. Louis 7.

Technic Inc., 39 Snow St., Providence 3, R. I.

UDYLITE CORP., 1649 E. Grand Blvd., Detroit 11.

U. S. Galvanizing & Plating Equipment Corp., 27 Heyward St., Brooklyn 11.

Wagner Litho Machine Div., National Standard Co., Harborside Terminal, Jersey City 2, N. J.

Elevators, Industrial

Craig Ridgway & Son Co., Coatesville, Pa.

Globe Hoist Co., Mermaid Lane & Queen St., Philadelphia 18.

Link-Belt Co., 519 N. Holmes Ave., Indianapolis 6, Ind.

Otis Elevator Co., 260 11th Ave., New York 1.

Revolvator Co., 2061 86th St., No. Bergen, N. J.

Elevators, Portable

Barrett-Cravens Co., 3255 W. 30th St., Chicago 23.

Chisholm-Ryder Co., Highland Ave., Niagara Falls, N. Y.

Gifford-Wood Co., Hudson, N. Y.

JEFFREY MFG. CO., 925-99 N. 4th St., Columbus 16, Ohio.

Lamson Corp., Syracuse, N. Y.

Link-Belt Co., 310 W. Pershing Rd., Chicago.

Lewis-Shepard Products, Inc., Walnut St., Watertown, Mass.

Portable Machinery Div., Duke St., York, Pa.

Service Caster & Truck Div., N. Brownswood Ave., Albion, Mich.

STANDARD CONVEYOR CO., North St. Paul 9, Minn.